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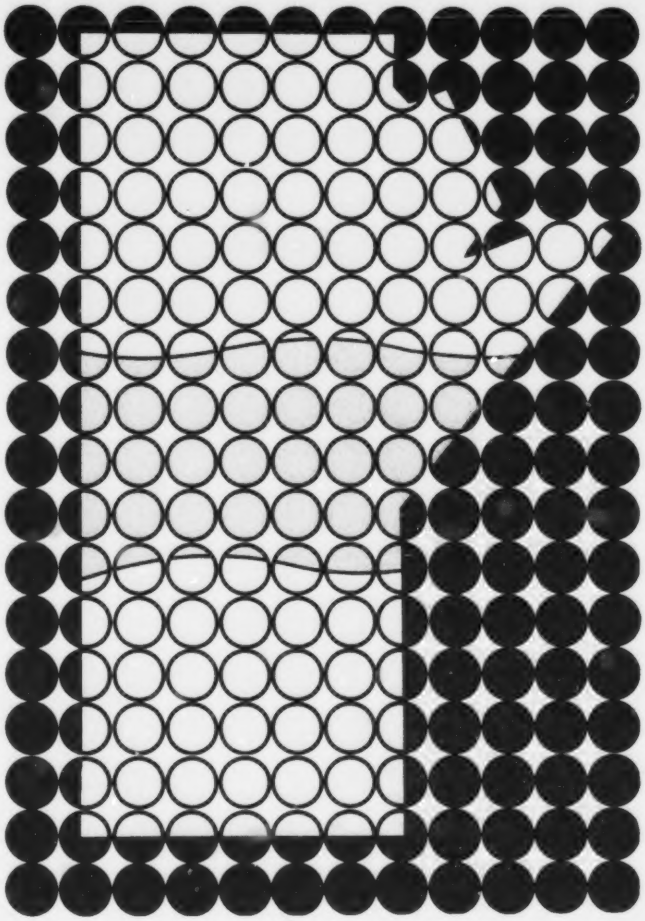

CANADA-MANITOBA
Soil Survey

Soils of the Rural Municipalities of Ste. Anne and La Broquerie, and part of the Local Government District of Stuartburn

Report D49

Government of Canada Gouvernement du Canada
Government of Manitoba Gouvernement du Manitoba

SOILS REPORT NO. D49 1985

Soils of the Rural Municipalities of Ste Anne and La Broquerie, and Part of the Local Government District of Stuartburn

by

Larry Hopkins

CANADA MANITOBA SOIL SURVEY

AGRICULTURE CANADA

MANITOBA DEPARTMENT OF AGRICULTURE

DEPARTMENT OF SOIL SCIENCE, UNIVERSITY OF MANITOBA

PREFACE

This interim report and map of the detailed field and laboratory study of the soils of the Rural Municipalities of Ste Anne and La Broquerie and part of the Local Government District of Staurtburn, is one in a new series of such soil survey reports covering special interest areas in southern Manitoba. These reports reflect the growing concern by various government agencies that support the Canada-Manitoba Soil Survey, that a knowledge of the development and distribution of the soils of Manitoba is the key to understanding their properties, behaviour and response to management. This concern requires that soils be described both in terms of their basic properties and the nature of the environmental setting in which they are found. Thus, when an area such as this requires delineation of land of high or low value for crop production or for other uses, the basic reference document is an accurate and reliable soil map.

The land resource information included in this resurvey covers approximately 105 280 hectares. It includes only a fraction of the area covered in the former reconnaissance survey of the Winnipeg Norris Map Sheet Area (Report No. 5, 1953). However the projected more intensive use of the soils for agriculture and the growing competition for other uses of land in the area has created a need for more up-to-date, more accurate and more detailed soil information. The increased examination of soils in the field, the use of current aerial photography, the use of improved methods of studying soils in the laboratory and the accumulated knowledge of the properties and uses of soils over the years have all contributed to the additional information contained in this new series of reports and maps.

During the course of the resurvey of the area, a significant volume of site specific data for the soils mapped in the area was generated, that for practical reasons cannot be included in this interim report. These data have been input into the Canada Soil Information (CanSIS) data bank. This computerized system of data management permits automated manipulation and statistical evaluation of large volumes of data for soil characterization and interpretation. This data will shortly be available on request. In addition, the cartographic file of CanSIS provides a capability to produce derived maps of various kinds quickly and inexpensively. The types of derived maps than can be generated from the basic soil map include the sixteen interpretations that are provided in tabular form in this report as well as a number of single feature maps for such characteristics as drainage, texture of surface deposits, slope, stoniness, distribution of salinity, etc. A package of interpretive maps and single feature derivative maps can be made available on request to: The Canada Manitoba Soil Survey, Dept of Soil Science, Rm. 362, Ellis Bldg., University of Manitoba, Winnipeg R3T 2N2.

The Canada-Manitoba Soil Survey trusts that this report and accompanying map will be of value to all individuals and agencies involved with the use of land within the map area.

ACKNOWLEDGEMENTS

Grateful acknowledgement is made to the following persons and agencies.

R.E. Smith, Director of Canada-Manitoba Soil Survey for reviewing the manuscript and soil correlation.

R. DePape and J. Griffiths for compiling and drafting the maps and sketches.

M. Brown for digitizing map sheets.

P. Haluschak, E. St. Jacques, R. Mirza, K. Yueng and J. Madden for soil analyses.

The soils were mapped by W. Fraser and L.A. Hopkins.

Those assisting in the field work were J. Johnson, R. Landry, D. Peristy, R. Shultz, and J. Smiley.

D. Sandberg for typing and assisting preparation of the report.

HOW TO USE THIS SOILS REPORT

This report of the Soils of the Rural Municipalities of St Anne and La Broquerie and part of the Local Government District of Stuartburn contains a considerable amount of information on the study area, the soils; their origin, their formation, their classification and their potential for various uses such as dryland agriculture, irrigation, engineering and recreation. The report is presented in four parts; Part I being a general description of the area; Part II describes mapping methodology: Part III discusses the formation, classification and morphology of soils and Part IV is an interpretive section on soils for various uses. The soil maps are found in the back of the report.

In order to assist the user in retrieving pertinent soil information quickly, the following steps are suggested:

STEP 1 Consult the "General Index to Map Sheets," Appendix I. Locate the area of interest and note the appropriate map sheet number.

STEP 2 Consult the map section. Select the appropriate map sheet(s) and locate the specific areas of interest.

STEP 3 Note the map unit symbols that occur in the area of interest. Compound symbols have their percentile composition in the numerator. In this map area the denominator indicates the landscape features of topography (alphabetic) and stoniness (numeric) together or alone. See glossary for definitions.

STEP 4 Consult the "Legend for the Map Area," Appendix I. Symbols are listed alphabetically, giving soil name, soil texture, drainage, mode of soil parent material deposition and subgroup.

STEP 5 For interpretive information, consult the appropriate tables and corresponding guides in Part IV.

STEP 6 For more specific information on the soils, consult Part III where the soils are described in alphabetical order according to soil name. Physical and chemical analyses of the soils are given in Appendix C.

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PART 1

GENERAL DESCRIPTION OF THE STUDY AREA

1.1 LOCATION AND EXTENT

This report describes the reconnaissance soil survey of the municipality of La Broquerie, port of the municipality of Ste Anne and part of the local government district of Stuartburn. The project is located in south eastern Manitoba (Figure 1) and encompasses all of townships 3,4,5,6,7 ranges to 7 to 8, plus township 3 range 6 and parts of township 8 ranges 7 and 8. This project is a resurvey of part of the broader reconnaissance of the old Winnipeg-Morris Map Sheet (Report No. 5, 1953). A total of 105 280 hectares were mapped in this project.

A total of 18 sections (4 664 hectares) were surveyed in detail, 14 sections between Stienbach and La Broquerie along highway 52 and 4 sections around the town of Marchand.

1.2 LAND USE

The land use within the study area is primarily agriculture, with the forested and poorly drained organic soil areas being used for a wildlife management reserve.

A small portion of the area is into intensive grain farming of cereal grains, rapeseed and corn. In the La Broquerie area dairy farms predominate. Mixed farming and cattle pasture are the dominant uses of the poorly drained and partially forested areas.

1.3 RELIEF AND DRAINAGE

The relief of the map area varies from 312 m.a.s./(1,025 ft.) in the southeastern part of the project to 259 m.a.s./(850 ft.) in the northwestern part of the project near Ste Anne (Figure 2). This gives a .9 meter drop per kilometer in going from the southeast to the northwest parts of the project. The overall landscape is level to gently sloping.

The area is drained by the Seine River, Rat River, Joubert Creek and the Vita drain (Figure 2). The headwaters of the Siene River are found in the Marchand area and provides drainage for agricultural lands along the river. In times of high water the river also drains the wetlands (bogs and fens). The southern part of the project which is flatter (low relief wetlands), is drained by the Joubert Creek which empties into the Rat River, the Rat River and the Vita drain empties into the Roseau River.

The lack of a good land drainage system is a major impediment to agricultural development in these areas. The existing rivers and creeks cannot take the water off these areas quickly enough to permit the production of crops on a sustained basis. High groundwater levels as a result of regional hydrologic conditions also compound the drainage problems in the region.

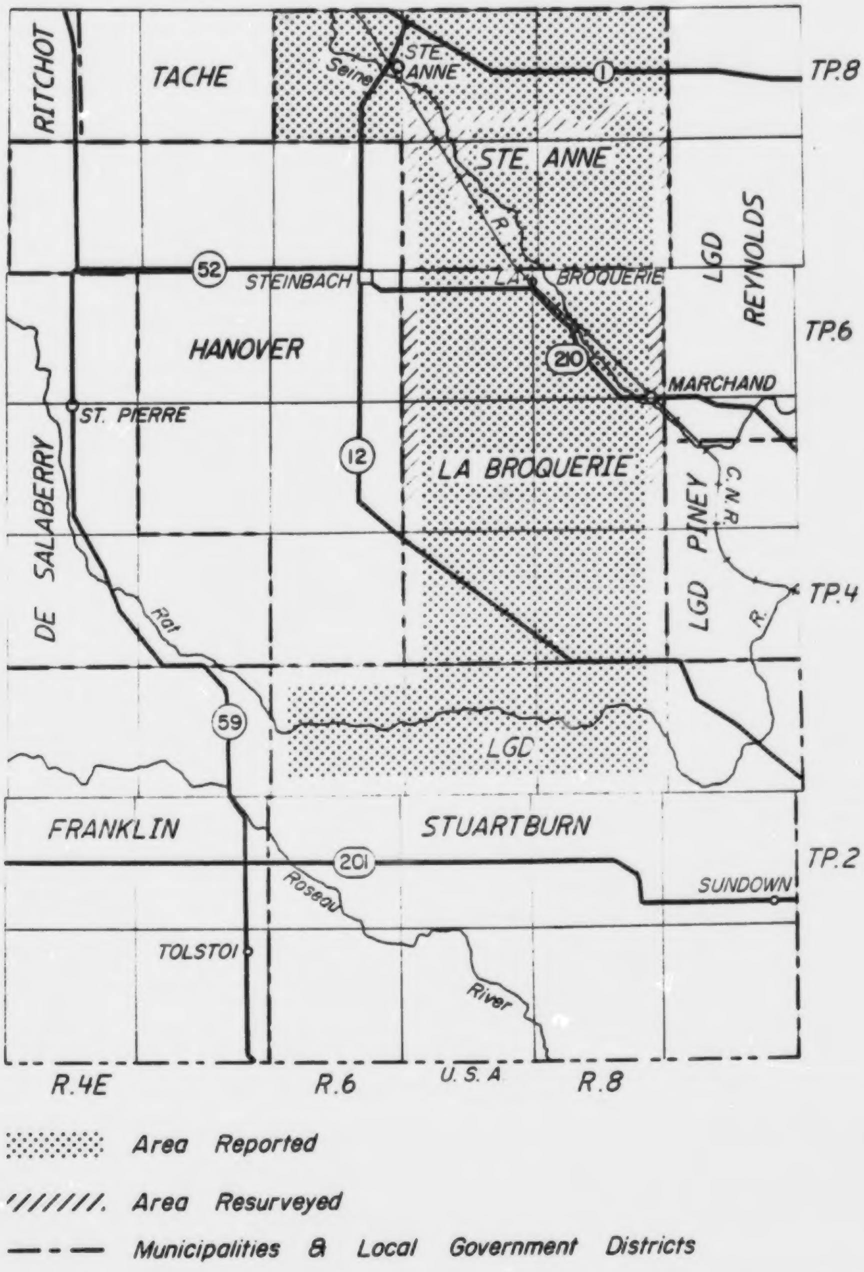
RITCHOT
TACHE
STE. ANNE
Seine
1
TP.8
STE. ANNE
R.
LGD REYNOLDS
52
STEINBACH
LA BROQUERIE
TP.6
HANOVER
210
MARCHAND
ST. PIERRE
12
LA BROQUERIE
C.N.R.
PINEY
DE SALABERRY
LGD
TP.4
Rat
R.
59
LGD
FRANKLIN
STUARTBURN
TP.2
201
SUNDOWN
Roseau
TOLSTOI
River
R.4E
R.6
U.S.A
R.8
Area Reported
Area Resurveyed
Municipalities & Local Government Districts

Figure 1: Location of Study Area.

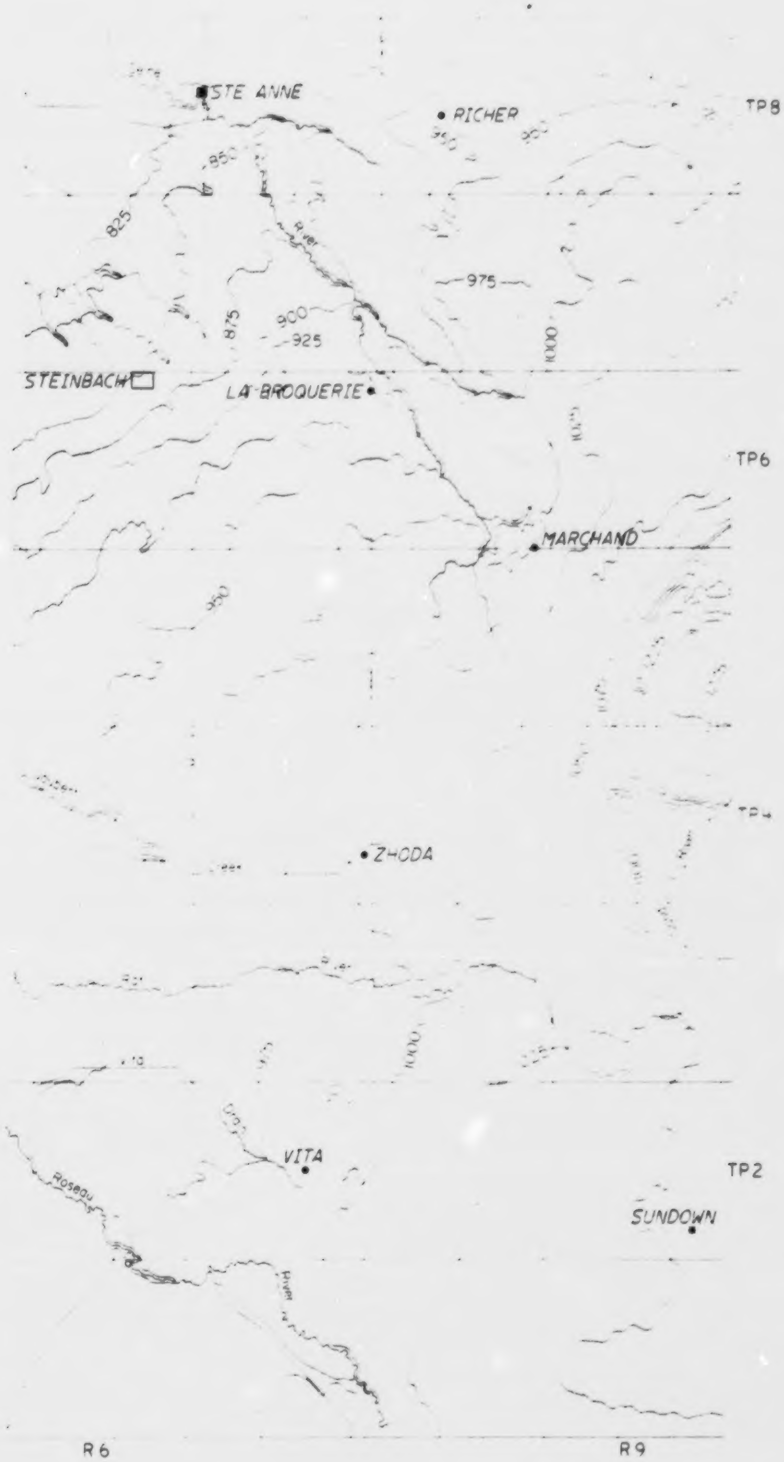
STE ANNE
RICHER
TP8
850
825
River
975
875
900
925
1000
STEINBACH
LA BROQUERIE
TP6
MARCHAND
950
TP4
ZHODA
River
1000
VITA
TP2
SUNDOWN
Roseau
River
R6
R9

Figure 2: Principal Relief and Drainage Systems for the Study Area.

1.4 GEOLOGY

The bedrock formations of the study area are shown in Figure 3 The majority of the area is underlain by Paleozoic era dolomites limestones, and cherty dolomites (Red River formation) of the Ordovician period. A very small part of the area is underlain by Ordovician sandstones, quartzose sandstone, and shale (Winnipeg formation). The bottom three townships which have the Rat River flowing through them are underlain by Mesozoic era dolomites, gypsums, anhydrites, limestones, sandstones, shales and siltstones of the Jurassic period (Amaranth, Reston and Melita formations).

The carbonate bedrock that underlies most of the Municipality of Ste Anne constitutes the principal aquifer. Water in the carbonate aquifer is of good to excellent quality with total dissolved solids concentration less than 400 P.P.M. and hardness less than 350 P.P.M.[1].

In the eastern portion of the Municipality of Ste Anne sandstone layers of the shale-sandstone formation constitute another important aquifer. The water quality is good with total dissolved solids being 400 P.P.M. and hardness of 200 P.P.M.

In the Municipality of Ste Anne, sand and gravel aquifer are common within the glacial till deposits east of Highway 12. Water quality is similar to or better than the carbonate aquifer. This aquifer is subject to pollution.

No water resource data was found for Municipality of La Broquerie and Local Government District of Stuartburn.

1.5 SURFACE DEPOSITS AND PHYSIOGRAPHIC AREAS

The study area lies within the Manitoba Plain Division of the Interior Plains Region of Canada. The two subsections of the Manitoba Plain found within the study area are the South Eastern Plain and the Red River Plain (Figure 4).

The subsection covering the largest aerial extent is the South Eastern Plain. This is a level to gently undulating lacustrine veneer and morainal plain, having surface deposits that are 30 to 80 meters deep over bedrock. These surface deposits are dominantly sandy to clayey lacustrine sediments, and local areas of waterworked extremely calcareous, loamy, very stony tills and gravelly outwash (Figures 5, 6, 7, 8). The study area has no lakes, and a low density, parallel to dentritic network of secondary drainageways flowing northwest to the Red River.

The other subsection found in the study area is the Manitoba Plain, which covers only 4 000 hectares, of the area surveyed. This subsection is a level to very gently sloping, lacustrine plain. Its surface deposits are dominantly moderately calcareous, clayey lacustrine sediment. Minor very strongly calcareous loamy deltaic lacustrine sediments occur along its southeastern margin. Depth of the surface deposits varies between 15 to 60 meters.

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[1] M. Rutulis. 1974. Water Resources in the Winnipeg Region.

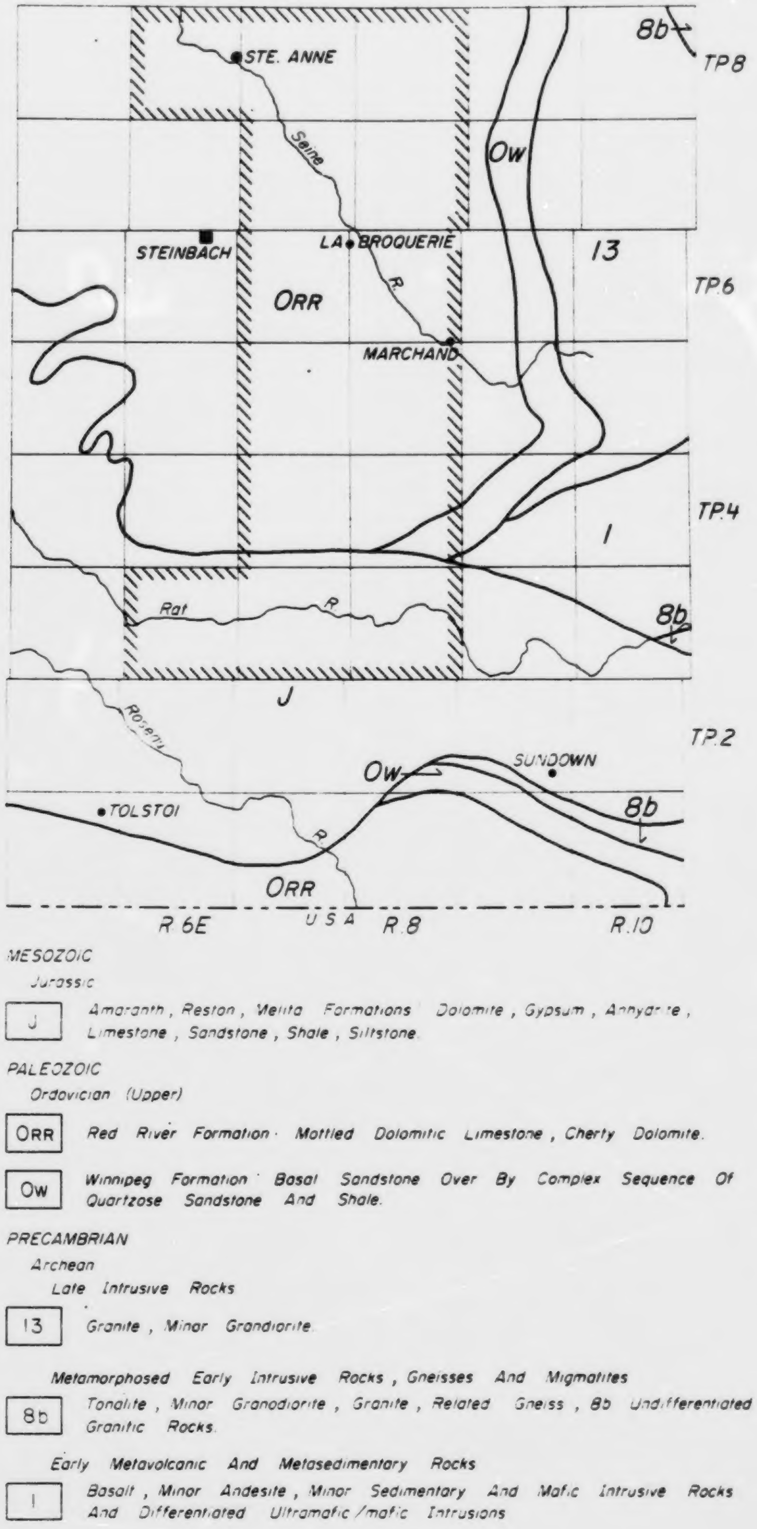

8b
TP.8
STE. ANNE
Seine
Ow
STEINBACH
LA BROQUERIE
13
TP.6
ORR
R.
MARCHAND
TP.4
1
8b
Rat
R.
J
Roseau
TP.2
SUNDOWN
Ow
TOLSTOI
8b
R
ORR
R 6E
U S A
R.8
R.10
MESOZOIC
Jurassic
J
Amaranth, Reston, Melita Formations Dolomite, Gypsum, Anhydrite, Limestone, Sandstone, Shale, Siltstone.
PALEOZOIC
Ordovician (Upper)
ORR
Red River Formation · Mottled Dolomitic Limestone, Cherty Dolomite.
Ow
Winnipeg Formation · Basal Sandstone Over By Complex Sequence Of Quartzose Sandstone And Shale.
PRECAMBRIAN
Archean
Late Intrusive Rocks
13
Granite, Minor Grandiorite.
Metamorphosed Early Intrusive Rocks, Gneisses And Migmatites
8b
Tonalite, Minor Granodiorite, Granite, Related Gneiss, 8b Undifferentiated Granitic Rocks.
Early Metavolcanic And Metasedimentary Rocks
1
Basalt, Minor Andesite, Minor Sedimentary And Mafic Intrusive Rocks And Differentiated Ultramafic/mafic Intrusions

Figure 3: Geology of the Study Area.

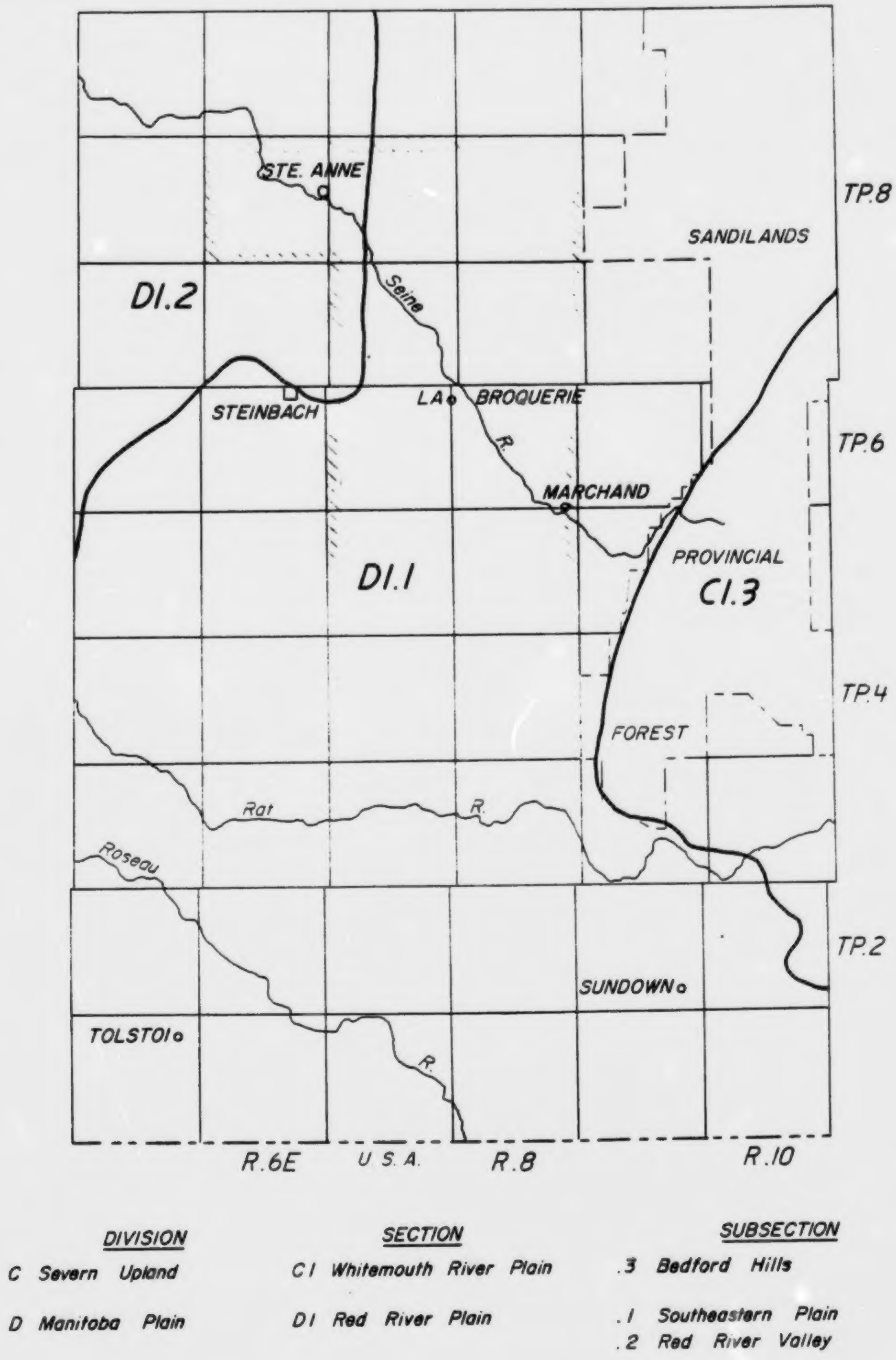

STE. ANNE
SANDILANDS
TP.8
D1.2
Seine
LA BROQUERIE
R.
STEINBACH
TP.6
MARCHAND
PROVINCIAL
D1.1
C1.3
TP.4
FOREST
Rat
R.
Roseau
TP.2
SUNDOWN
TOLSTOI
R.
R.6E
U.S.A.
R.8
R.10
DIVISION
C Severn Upland
D Manitoba Plain
SECTION
C1 Whitemouth River Plain
D1 Red River Plain
SUBSECTION
.3 Bedford Hills
.1 Southeastern Plain
.2 Red River Valley

Figure 4: Physiographic Subdivisions in the Study Area.

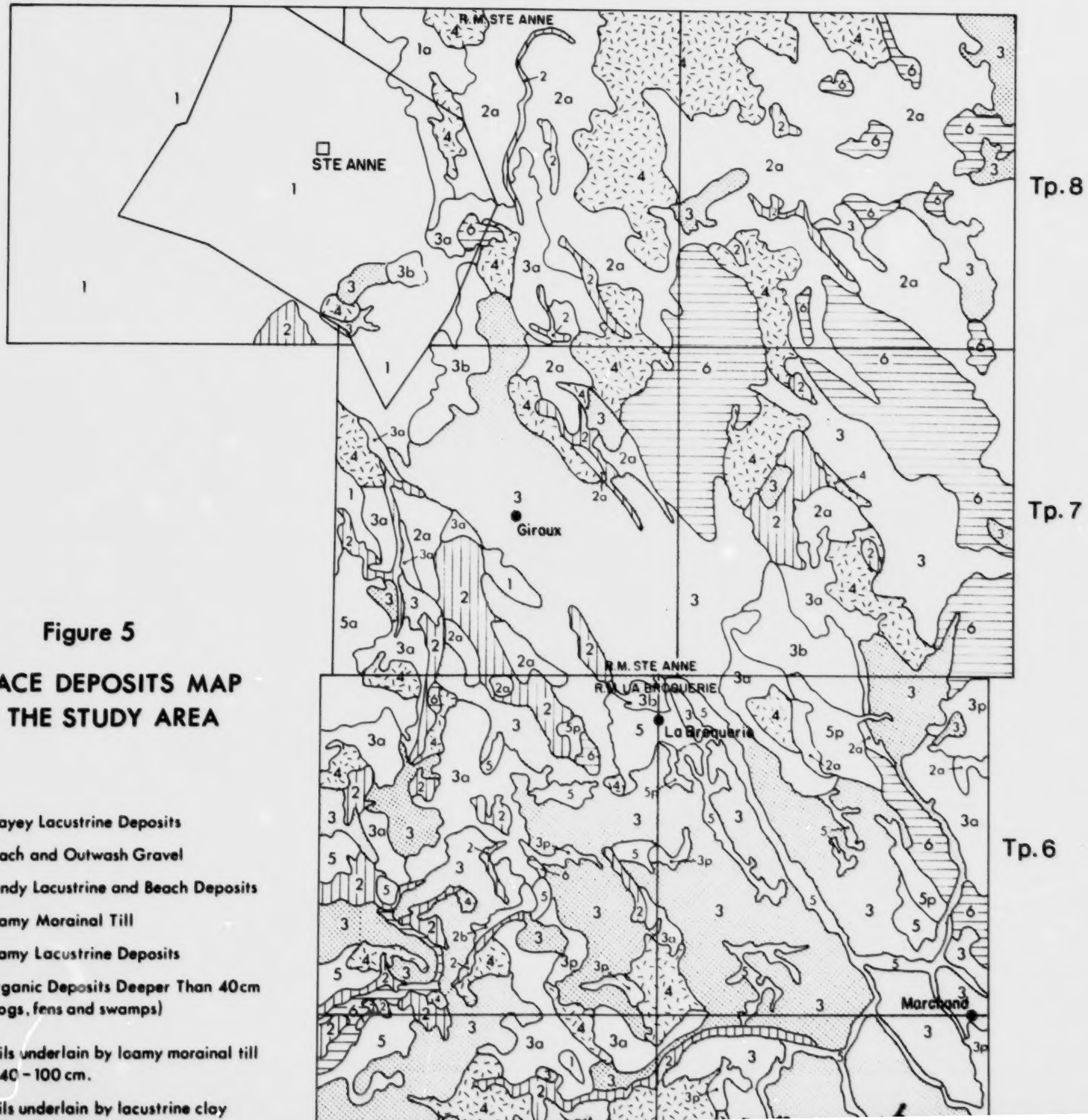
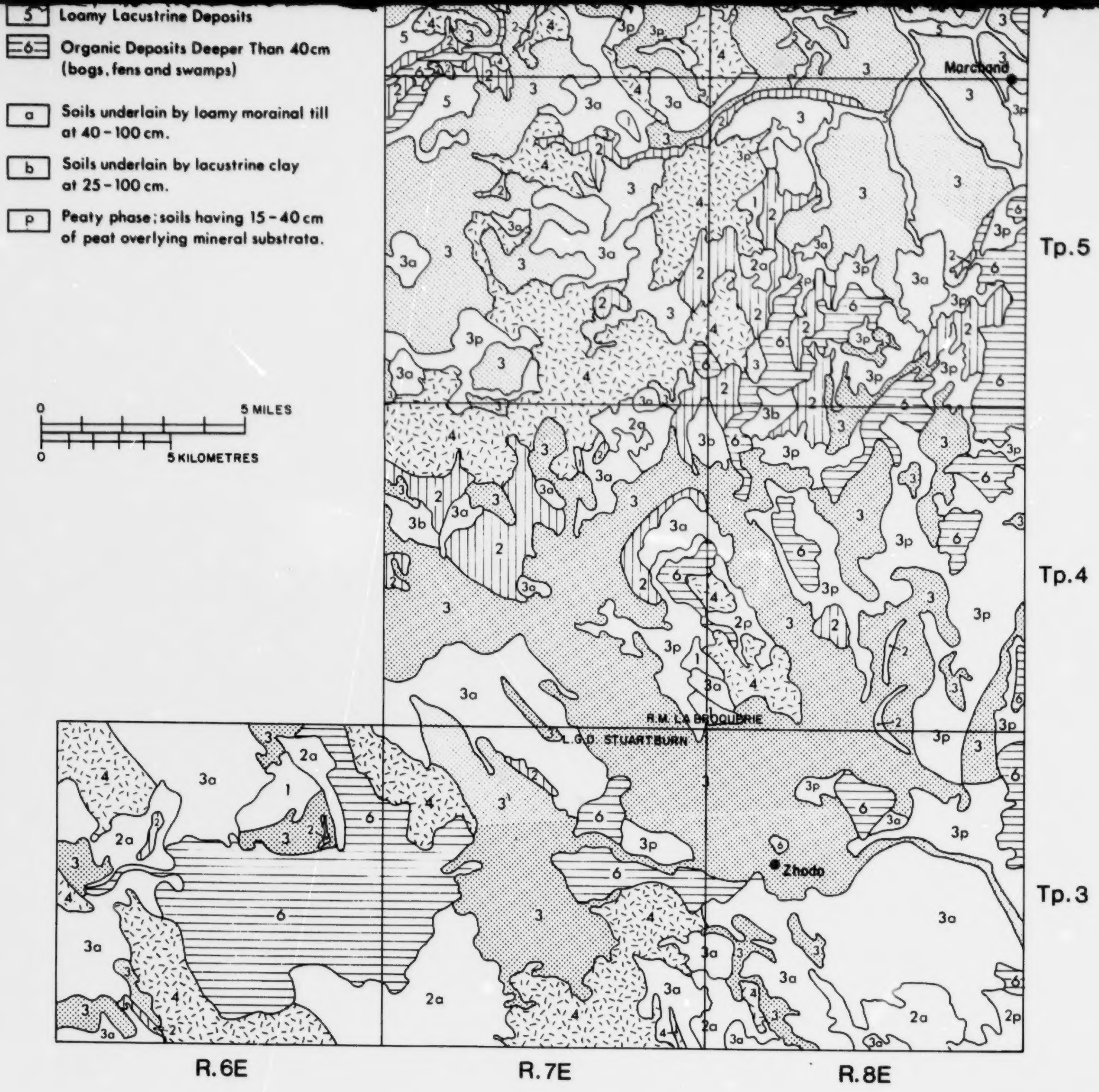

R.M. STE ANNE
STE ANNE
Giroux
R.M. STE ANNE
R.M. LA BROQUERIE
La Broquerie
Marchand
Tp. 8
Tp. 7
Tp. 6
1a
2a
3a
3b
3p
5a
5p
2b

Figure 5

SURFACE DEPOSITS MAP OF THE STUDY AREA

1	Clayey Lacustrine Deposits
2	Beach and Outwash Gravel
3	Sandy Lacustrine and Beach Deposits
4	Loamy Morainal Till
5	Loamy Lacustrine Deposits
6	Organic Deposits Deeper Than 40cm (bogs, fens and swamps)
a	Soils underlain by loamy morainal till at 40 – 100 cm.
b	Soils underlain by lacustrine clay


5 Loamy Lacustrine Deposits
6 Organic Deposits Deeper Than 40cm (bogs, fens and swamps)
a Soils underlain by loamy morainal till at 40-100 cm.
b Soils underlain by lacustrine clay at 25-100 cm.
p Peaty phase; soils having 15-40 cm of peat overlying mineral substrata.
0
5 MILES
0
5 KILOMETRES
Marchand
R.M. LA BROQUERIE
L.G.D. STUARTBURN
Zhoda
Tp.5
Tp.4
Tp.3
R.6E
R.7E
R.8E

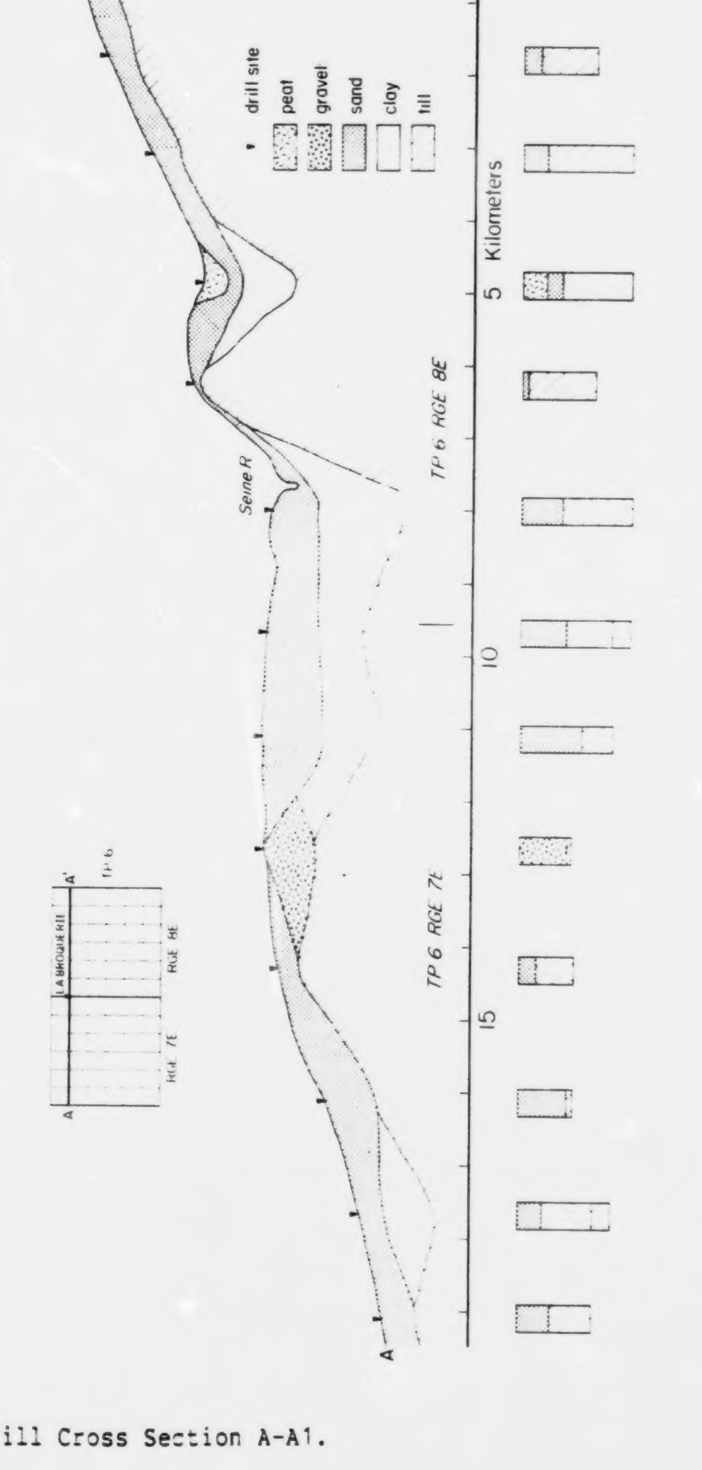

Elevation above sea level (meters)
310
300
290
280
270
A'
A
soil depth (meters)
0
1
2
3
4
drill site
peat
gravel
sand
clay
till
Kilometers
5
10
15
Seine R
TP 6 RGE 8E
TP 6 RGE 7E
LA BROQUERIE
TP 6
RGE 8E
RGE 7E

Figure 6: Deep Drill Cross Section A-A1.

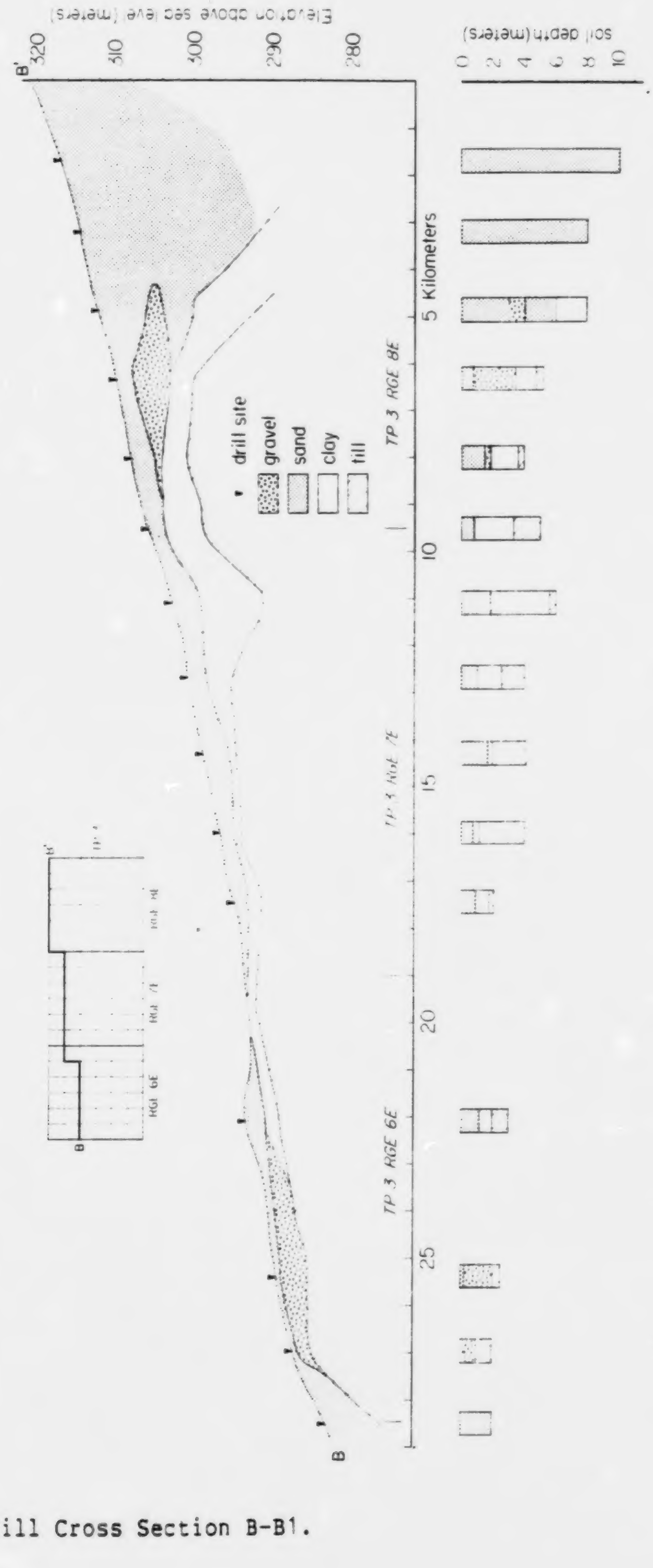

Elevation above sea level (meters)
320
310
300
290
280
soil depth (meters)
0
2
4
6
8
10
B'
B
5 Kilometers
10
15
20
25
drill site
gravel
sand
clay
till
TP 3 RGE 8E
TP 3 RGE 7E
TP 3 RGE 6E
RGE 6E
RGE 7E
RGE 8E

Figure 7: Deep Drill Cross Section B-B1.

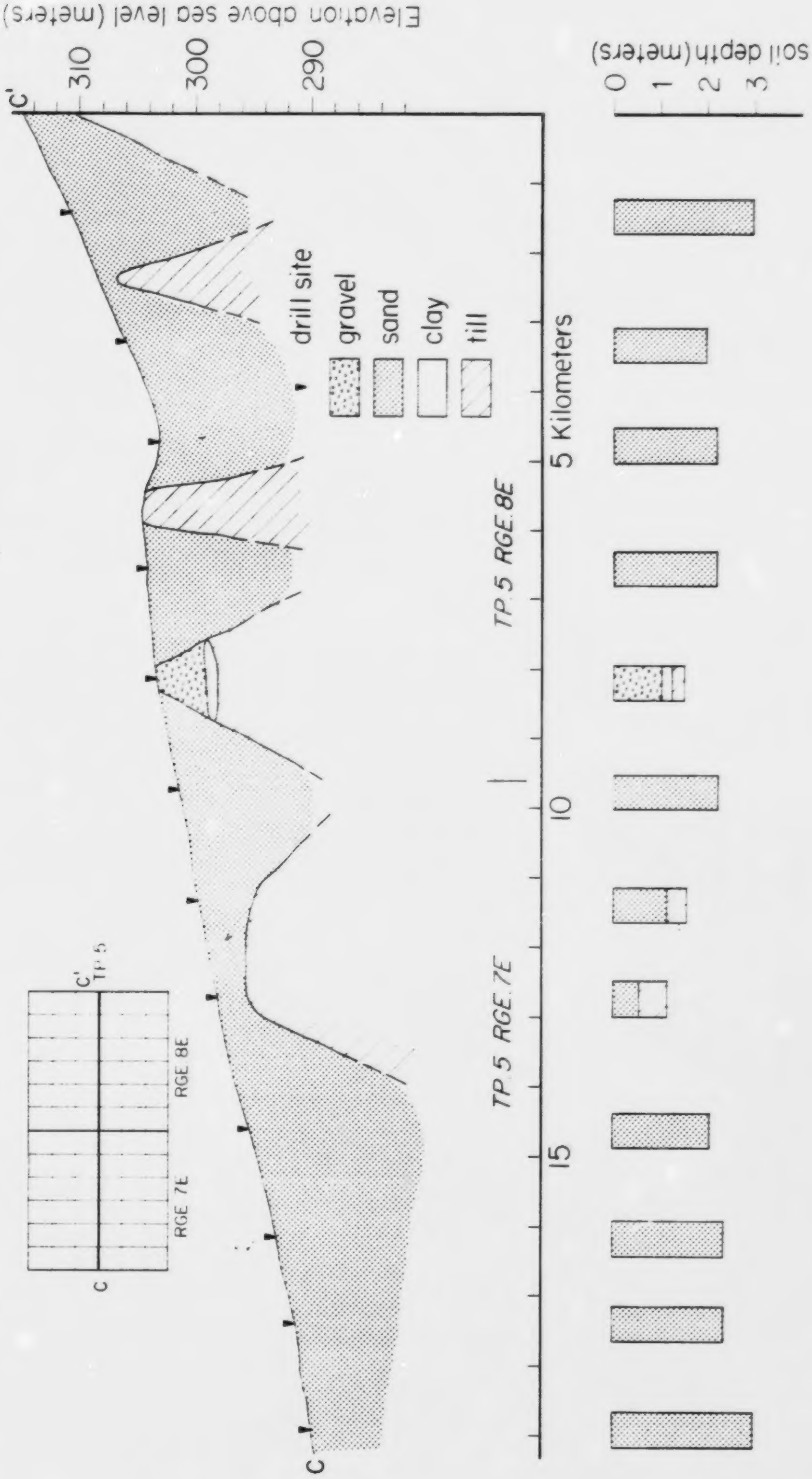

Elevation above sea level (meters)
310
300
290
C'
C
soil depth (meters)
0
1
2
3
5 Kilometers
10
15
TP.5 RGE.8E
TP.5 RGE.7E
drill site
gravel
sand
clay
till
C'
TP 5
RGE 8E
RGE 7E
C

Figure 8: Deep Drill Cross Section C-C1.

1.6 HYDROLOGY AND SOIL DEVELOPMENT

Hydrological activities pertaining to water movement within and beneath the soil profile also have a distinctive role in the development of soil profiles. The depth to water table and the direction of water movement in the saturated zone affect the type and degree of profile development. Where water tables (zone of saturation) are at relatively deep levels (e.g. 2.4 to 3 meters) and water movement in the saturated zone tends to be downward, away from the water table, the hydrologic condition is described as groundwater recharge. Recharge areas are characterized by a net downward movement of water in the unsaturated soil zone via such processes as infiltration and percolation. By these means, soil water in excess of field capacity is contributed to the groundwater zone and causes a rise in the water table. This rise occurs most dramatically in the spring after snowmelt.

On the other hand, where water tables are relatively close to the ground surface (e.g. .9 to 1.5 meters) and water movement in the saturated zone tends to be upwards to the water table, the hydrologic condition is described as groundwater discharge. In groundwater discharge areas, the forces of capillarity may transmit water from the water table directly to the soil surface where upon it is lost by evaporation. At the same time, it leaves behind the dissolved minerals and salts which accumulate near and/or on the soil surface.

There are, therefore, two distinct features of hydrology which may be directly related to soil development. They are: recharge, which results in leaching (removal of soluble constituents) of soil profiles, and discharge which results in deposition (accumulation) of soluble constituents in the soil profile.

The most obvious sites of groundwater discharge are easily recognized by the conspicuous presence of saline soils. White crystalline salt precipitates in and on the soil surface and the presence of salt tolerant vegetation are the more obvious features of saline soils. Imperfect and poorly drained carbonated soil profiles are also diagnostic of discharge areas. In the study area no saline areas were delineated.

Groundwater recharge sites on the other hand, can be recognized by the absence of salinity. The vegetation on such sites usually consists of grasses, willows and trees. Most groundwater recharge sites may be cultivated and cropped. The soils in these areas are invariably leached to different degrees which reflects the effects of recharge activity.

DRAINAGE CLASS	PROFILE TYPE	SOIL SERIES																	
WELL	Orthic Gray Luvisol			GSO	LGP	WOG		SLB											
	Eluviated Eutric Brunisol						PRG												
	Eluviated Dystric Brunisol						SDT												
	Dark Gray Luvisol				GLK	VLW	ZHB												
	Orthic Dark Gray			AND	GUO	LRY	DVD												
IMPERFECT	Gleyed Dark Gray Luvisol						BLO												
	Gleyed Gray Luvisol			PIY	VIT	SIK	WGI	CIO											
	Gleyed Solonetzic Dark Gray																	THG	
	Gleyed Dark Gray		KPN	IWO	BVR	KRW	PPL	PLN	GRX		LYW	WOM	NUS	GEW					PGU
	Gleyed Rego Dark Gray					SRL													
	Gleyed Solonetzic Black																	MRS	
	Gleyed Orthic Black																	SCY	
	Gleyed Eluviated Eutric Brunisol						PAN												
	Gleyed Eluviated Dystric Brunisol						LSD												
	Gleyed Rego Black						LSW							GNL			NIV	RIV	MRQ
	Gleyed Cumulic Regosol	LAB	SRF																
POOR	Rego Humic Gleysol (black soil zone)						MNT	SPG	PRA	LAM					BAM			OBO	KLT
	Rego Humic Gleysol (dark gray soil zone)	MAR		MEB	SUW	BYD					FOY	WDN		MLI		PMU		FYL	PGL

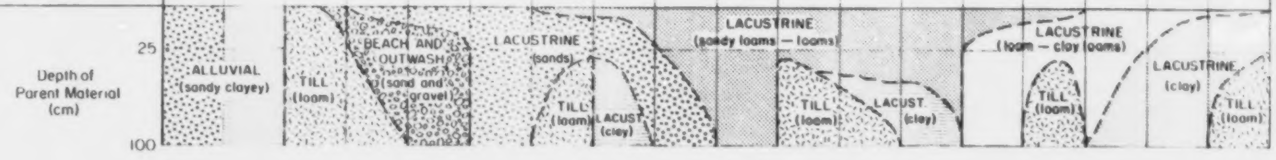

Depth of Parent Material (cm)
25
100
ALLUVIAL (sandy clayey)
TILL (loam)
BEACH AND OUTWASH (sand and gravel)
LACUSTRINE (sands)
TILL (loam)
LACUST (clay)
LACUSTRINE (sandy loams — loams)
TILL (loam)
LACUST (clay)
LACUSTRINE (loam — clay loams)
TILL (loam)
LACUSTRINE (clay)
TILL (loam)

Figure 9: Soil Series in Relation to Surface Deposits and Drainage.

1.7 CLIMATE

In relation to worldwide climatic conditions the study area lies within the Dfb region[2], and is designated as dominantly subhumid, cool continental. Due to its location in the center of the continent a great distance from the moderating effect of the oceans, the summer temperatures are higher, winter temperatures are lower and annual temperature range much greater than the world average for the same latitude.

The mean annual precipitation for the area is 515 mm with approximately 419 mm falling as rain during the period of April to October and about 96 mm as snow during the winter. June is the wettest month with 77 mm of rainfall[3].

The study area has a mean annual temperature of about 7.8°C. July is the warmest month with an average temperature of 25.8°C. January is the coldest month with an average temperature of -13.8°C. The average frost free season above 0 degrees C is 114 days.

1.8 SOIL TEMPERATURE

Soil temperature relates to areal climate, but the relationship is affected by soil depth, texture, soil water content, surface cover (vegetation, snow), landscape position and man's manipulation. Soil temperature follows a wave pattern in response to seasonal air temperature changes, the response being more rapid near the surface and progressively slower with depth. The soil gains heat during the period May to August, then loses heat from September to March. This cross-over of heat loss to heat gain takes place in April and heat gain to heat loss in the latter part of August.

The soil climate map of Canada summarizes the study area as having a cool Boreal soil temperature regime[4]. This Class is characterized as having a growing season (soil temperature over 5°C at 50 cm) of greater than 170 days and 1,250 to 1,288 growing season degree days above 5°C.

1.9 . SOIL MOISTURE

The moisture regime of soils depends on many factors such as precipitation, texture, organic matter, vegetation, depth of water table, etc. However, at a local scale, all soil surfaces, even those generally considered to be flat, can be thought of as sequences or patterns of convexities and concavities, more commonly referred to as highs and lows (relief). This irregular configuration of ground surface affects the soil moisture regime in two ways.

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[2] W. Koppen and Geiger (1936). "Handbuck der Klimatologie", Bond I., Teil C., Gebruder Borntraeger, Berlin, 1936.

[3] Canadian Climatic Normals, 1941-1980, Atmospheric Environment Service, Environment Canada.

[4] Soil Climatic Map of Canada. 1972. Prepared by the Soil Research Institute of the Research Branch, Canada Dept. of Agric., Ottawa and printed by the Surveys and Mapping Branch, Dept. of Agriculture.

Surface water tends to move from highs to lows where it often ponds after snowmelt or after heavy rains. The soils in these two positions, therefore, exist and develop under two distinctly different moisture conditions (see Hydrology). In general, soils developed on highs are warmer, drier and have a shallower profile than soils developed in lows or depressions.

Soil moisture also affects the chemical weathering processes in the soil such as oxidation and reduction, and the kind of vegetation, i.e. hydrophytic, mesophytic or xerophytic, that will grow in the soil.

According to the soil climate map of Canada, the study area is summarized as having a subaquic subhumid moisture regime with a significant moisture deficit within growing season of 6.4 to less than 12.7 cm. The soil may be saturated for short periods during the growing season.

1.10 **VEGETATION**

The area mapped lies within the Manitoba Lowland Section of the Boreal Forest Region of Canada as delineated by Rowe[5].

Good stands of white spruce, trembling aspen, and balsam poplar, sometimes in mixture with balsam fir and white birch occur on better drained sandy lacustrine and alluvial areas along rivers and creeks. Trembling aspen and balsam poplar are the dominant species in the study area. Jackpine is the dominant species on the well drained sandy and gravelly ridges. The prevailing vegetation on the poorly drained wetlands consist of black spruce and tamarack on the flat treed peatland areas (bogs) while black spruce tamarack and white cedar can be found in the treed, nutritionally rich peatland areas (swamps). Treeless peatlands areas (fens) are characterized by grass and sedge species.

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[5] Rowe, J.S. 1972. Forest Regions of Canada. Publication No. 1300, Dept. of the Environment, Canada Forestry Service, Ottawa.

PART 2

METHODOLOGY

2.1 MAPPING

Soil mapping was conducted by soil scientists who examined soil profiles to depths of one meter along roads and trails. The soils were examined at about 250 meter intervals along each road or trail in the reconnaissance survey. The eighteen sections done in detail were examined at about 150 meter intervals along each of two traverses in each section, plus the examinations along the road.

Boundaries delineating the various soil types in the map area were compiled on an air photo mosaic at a scale of 1:40,000 or 1 3/8 inches equal one mile for reconnaissance survey, and on photo mosaics at a scale of 1:20,000 or 3 inches equal one mile for the detailed survey.

2.2 UNITS OF MAPPING

The basic unit of mapping in the study area is the soil series. Is defined as a naturally occurring soil body such that any profile within that body has a similar number and arrangement of horizons, whose color, texture, structure, consistence, thickness, reaction and composition are within a narrowly defined range. Any additional features of the landscape or surface expression are expressed as phases and include degree of erosion of the soil profile, slope class, stoniness or salinity.

The delineation of map units, whether they be single soil series or soil series complexes, is not exact; they vary with local topography, drainage, erosion and soil profile properties. The decision to outline and label and given area is based on interpretation and extrapolation of observed soil and landscape features and air photo interpretation. The delineation of soil boundaries serves to separate soils having properties and conditions which are significant for potential use as field management units.

Delineated areas that are homogeneous in soil properties and external features are labelled as simple mapping units. This area, however, may contain a small proportion of related but unlike soil series or phases. Where different soils or external properties occur in intricate patterns and in such small areas that it is not practical to show them separately because of map scale, they are combined to form compound or complex mapping units. The dominant and significant kinds of related but unlike soil series and phases that occur in such units are indicated in percentile proportions.

Very often, it is desirable to indicate by map unit symbol, minor variations in certain intrinsic properties of soils or landscape features that deviate from the normal. These variants or phases of series unually affect soil management. In the study area, the affect of two such properties and features are indicated.

These are slope class and degree of stoniness. The degree or magnitude of each is designated as follows:

Slope Class

Topography - Refers to the percent slope and the pattern or frequency of slopes in different directions. Capital letters are used to denote single slopes, and lower-case letters are used for multiple slopes (irregular surface).

Single/Complex slopes class name		Percent
A	level	0-0.5
a	nearly level	
B	very gently sloping	0.5-2
b	gently undulating	
C	gently sloping	2-5
c	undulating	
D	moderately sloping	5-9
d	gently rolling	
E	strongly sloping	9-15
e	moderately rolling	
F	steeply sloping	15-30
f	strongly rolling	
G	very steeply sloping	30-60
g	hilly	

Stoniness

The relative proportion of stones in or on the soil. The classes of stoniness are defined as follows:

Stones 1. Slightly stony. Land having 0.01-0.1% of surface occupied by cobbles and stones. Cobbles and stones 7.5-30 cm in diameter, 10-30 m apart. The stones offer only slight to no hindrance to cultivation.

Stones 2. Moderately stony. Land having 0.1-3% of surface occupied by cobbles and stones. Cobbles and stones 7.5-30 cm in diameter, 2-10 m apart. Stones cause some interference with cultivation.

Stones 3. Very stony. Land having 3-15% of surface occupied by cobbles and stones. Stones 7.5-30 cm in diameter, 1-2 m apart. There are sufficient stones to constitute a serious handicap to cultivation.

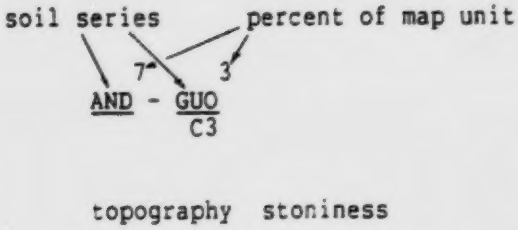
Stones 4. Exceedingly stony. Land having 15-50% of surface occupied by cobbles and stones. Stones 7.5-30 cm in diameter, 0.7-1.5 m apart. There are sufficient stones to prevent cultivation until considerable clearing has been done.

Stones 5. Excessively stony. Land having more than 50% of surface occupied by stones. Stones 7.5-30 cm in diameter, less than 0.7 m apart. The land is too stony to permit cultivation.

The convention employed to indicate these features in the map symbol is as follows:

If none of the above properties are observed to be significant, the map symbol representing the unaffected series is used alone without modifiers. In the area just surveyed, topography and stonines were the only features encountered, so the only symbols encountered would be an alphabetic symbol for topography and a numeric symbol for stoniness.

For example, the compound map unit coded:


soil series
percent of map unit
7
3
AND - GUO
C3
topography
stoniness

2.3 SAMPLING

During the course of field investigations and mapping, soil samples were taken at selected locations for soil characterization.

Thirty profiles were described in detail and sampled for soil characterization analysis. Forty-five drill sites in the area were examined to a depth of 2 to 3 meters to enhance assessment of parent materials for impact on various uses.

PART 3

FORMATION, CLASSIFICATION AND MORPHOLOGY OF SOILS

This section describes the important characteristics of the soils and their relationship to the factors of soil development, and provides a description of the classification and morphology of the soils in the study area.

3.1 SOIL DEVELOPMENT

The most important active factors in soil formation are the temperature and moisture conditions within the soil (i.e. the soil climate). Under native conditions, the soil climate determines the type of biological life which in turn determines the type of, and the manner in which organic matter is added to the soil. The soil climate also determines the micro-organism activity, the rate of production and decomposition of organic matter, the rate and extent of mineral weathering, and the rate at which products of weathering are accumulated in, or removed from the soil.

The soil climate may differ within relatively short distances because of differences in topography and drainage. Knolls or sloping areas are usually "less moist" or "locally arid" as a portion of the precipitation may run off. Depressions are often "locally humid" as they collect water and are wetter and cooler than adjacent soils. Normally the soils developed on the well drained sites have a greater movement of soluble and weathered products and result in the development of A, B, C horizons, while soils in the level to depressional sites develop only A and C horizons.

In the study area, the degree of development is related to the regional climate and the degree of leaching, translocation and accumulation of the soluble and colloidal fractions of the soil. In grassland areas, the amount of water available for leaching is low, but sufficient to support grassland vegetation; this results in accumulation of organic matter in the mineral surface and gives the soils the "black color". The translocation of soluble and colloidal fractions is relatively shallow. In transition areas from grassland to forest such as is the case in the study area, the soil climate is favorable for tree growth as well as grassland species. There is a greater degree of leaching and translocation than in the grassland area proper, and less organic matter accumulation occurs in the surface horizon. The result is the formation of soils with a "dark gray" surface and identifiable accumulation of translocated products such as clay and organic matter lower in the soil profile. Under more favorable moisture conditions of forest regions, there is a greater degree of leaching and translocation of soluble and colloidal soil material resulting in soils with a characteristic leaf mat, a leached "gray" A horizon and an accumulation horizon of translocated clay and organic matter. These soils are characterized as Gray Luvisols.

Brunisolic soils also develop under cool humid conditions and forest vegetation. The soils in this area that are developed on coarse textured outwash deposits are limited for agriculture use by their low moisture and nutrient holding capacity.

In a similar climatic zone, soils may differ due to the texture and mineralogical composition of the parent material. Soils developed on moderately coarse to medium texture are more permeable to water and allow for greater leaching of the soluble and colloidal fraction as compared to finer textured soils. Soils developed on moderately calcareous sediments are noticeably deeper than soils developed on strongly calcareous sediments; soils developed on the extremely calcareous material are very shallow under grassland, parkland or forested conditions because of the difficulty of leaching the large quantity of lime carbonate present; the maximum depth of soil development on these extremely calcareous materials is 20 to 30 cm.

Normal soil development is also affected by the length of the saturation period in an area affected by surface ponding, lateral inflow, seepage or a near surface groundwater. Under these conditions, the leaching of soluble and colloidal material is minimal, and in some cases the translocation of soluble soil material in toward the surface; the soil environment is altered from an oxidative state to a depleted oxygen or reductive state. The characteristics commonly associated with restricted drainage are dull soil colors, the development of mottles of iron and manganese, the presence of lime carbonate near the surface of the soils, the presence of, and accumulation of soluble salts within the rooting zone, and the accumulation of organic material at the surface.

Time is an important variable in soil development. Soils are generally considered to be in equilibrium with the environmental factors responsible for their formation. In this study area, the soils are youthful and are not strongly weathered because development has only taken place over approximately 8,000 years, that is, the period since deglaciation.

Soil development normally progresses from youth through maturity to old age during which time they come into a period of very slow change or equilibrium with the influencing factors. However, the development process can be influenced or interrupted by an alteration to any of the soil forming factors. For example, the activities of man can be considered as an influence on the factors of soil development. Man has altered such factors as vegetation and drainage and although the effects of this alteration on the soil profiles or properties are not apparent, they have been very significant. Research has shown that altered conditions due to cultivation has led to the reduction of the organic matter content of grassland soils by as much as 50 percent.

3.2 THE SOIL PROFILE

A soil that has come into equilibrium with its environment developes characteristics or morphology unique to itself and is considered a mature soil. Those that have not come into equilibrium with their environment are considered immature. A mature soil when viewed in vertical cross-section, consists of soil layers called soil horizons. The main or master horizons have been designated by the letters L, F, H, for organic layers and A, B, C for mineral horizons. Lower case suffixes are used to indicate the type of master horizons and arabic numerals are used when further division into subhorizons are required. If the soil profile is developed from nonconforming parent materials, Roman numeral prefixes are used to indicate lithologic changes. Table 1 presents a hypothetical soil profile showing all principle horizons. Figure & study illustrates the use of the soil horizon nomenclature. The master horizon symbols and lower case letter suffixes are defined in more detail in the Glossary.

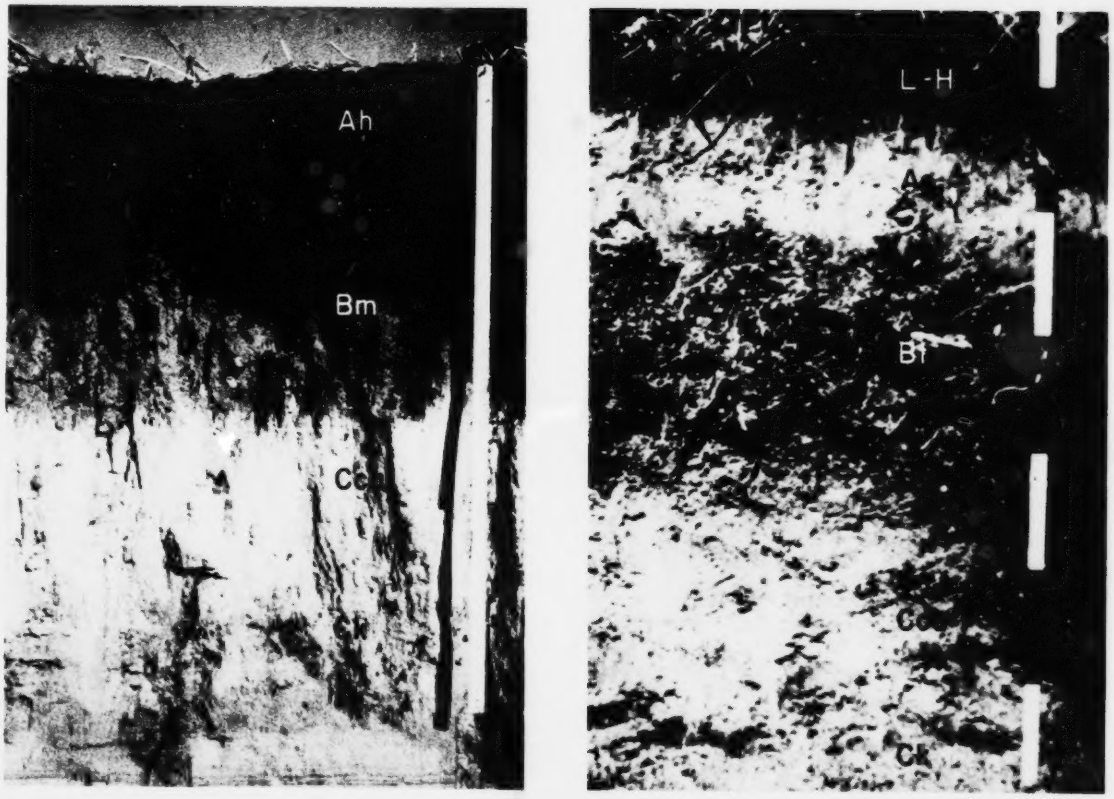
The A and B horizons are a reflection of the genetic forces operating on the parent material and together they form what soil surveyors call the solum of the soil. No simple definition of master horizons is possible since there are so many different kinds. In general, A horizons or surface layers are subjected to the greatest amount of weathering and leaching and/or organic matter accumulation. The B horizons, lying immediately below the A horizon contain most of the material leached from A horizons or have had other changes brought about by soil forming processes. The C horizons represent the relatively unweathered underlying geological deposits from which the solum has developed.

TABLE 1

A Hypothetical Soil Profile Showing All Principal Horizons

L, F, H Organic debris lodged on soil developed under forest, usually absent on soils developed under grasses.	L	Loose leaves and organic debris, largely undecomposed
	F	Organic debris, partially decomposed or matted
	H	Well decomposed organic matter, original structures indiscernible
A Horizons of maximum biological activity and maximum eluviation (removal of materials dissolved or suspended in water, or both).*	Ah	A dark colored horizon with a high content of organic matter mixed with mineral matter
	Ae	A light colored horizon of maximum eluviation. Prominent in Luvisolic and Podzolic soils; faintly developed or absent in Chernozemic and Brunisolic soils
	AB	Transitional to B, but more like A than B. Sometimes absent
B Horizons of illuviation (of accumulation of suspended material from A) or of maximum clay accumulation, or of blocky or prismatic structure, or both.*	BA	Transitional to A, but more like B than A. Sometimes absent
	Bm	Alteration due to hydrolysis or oxidation to give a change in color or structure as in Chernozemic soils
	Bmy	Like Bm but strongly disrupted by frost action
	Bt	Maximum enrichment of clay minerals as in Luvisolic soils
	Btj	Insufficient clay enrichment to qualify for Bt
	Bn	Maximum development of prismatic structure as in Solonetzic soils
	Bfh	Maximum enrichment of iron and organic matter as in Podzolic soils
	BC	Transitional to C
C The soil parent material. Occasionally absent, i.e. soil building may have extended to a stratum other than bedrock, and of distinctly different character from that in which the solum is found.	Cg	Denotes strongly gleyed horizons as in Gleysolic soils
	Cca	Accumulation of calcium carbonate
	Csa	Accumulation of soluble salts other than calcium carbonate
	Ck	Denotes presence of carbonate
	Cz	Frozen layer
Consolidated bedrock.	R	

+ It should be noted that not all of these horizons occur in any one soil profile.
* A and B represent the Solum, the genetic soil developed by soil-forming processes.
Source: Principles and Practices of Commercial Farming, 1977.



Black soil profile showing subdivision into soil horizons.

Gray Luvisol soil profile showing subdivision into soil horizons.

Figure 10 Examples of the use of Soil Horizon Nomenclature.

3.3 SOIL CLASSIFICATION

The Canadian System of Soil Classification is a hierarchical system in which the classes are based upon an evaluation of the properties of real bodies of soil. Classes are defined on measurable soil properties that reflect processes of soil formation and environmental factors.

The system organizes soil information into various classes at five different levels of generalization as follows:

Order - Classes at the order level are defined in terms of broad generalizations that reflect the soil environment and the effects of dominant soil forming processes. There are nine orders of soils in the Canadian System.

Great Group - Great groups are classes formed by the subdivision of each Order. Great Groups reflect differences in strength of dominant processes or a major contribution of a process in addition to the dominant one. For example, in Luvic Gleysols the dominant process is considered to be gleying, but clay accumulation in the B horizon of such soils is also a major process. There are twenty-eight great groups in the system.

Subgroup - Subgroups are formed by subdivision of each great group. Subgroups are differentiated on the basis of kind and arrangement of horizons that indicate: conformity to the central concept of the great groups, Orthic, intergrading toward soils in other orders, or special features such as calcium carbonate in B horizons. There are a total of 186 subgroups in the system.

Family - Classes at the family level are formed by subdividing subgroups. Families within a subgroup are differentiated on the basis of parent material characteristics such as texture and mineralogy, soil climatic factors, and soil reaction. The number of soil families are undetermined and grow with the progress of soil survey.

Series - The basic unit in the system of soil classification in Canada is the soil series. A soil series is defined as a naturally occurring soil body such that any soil profile within the body has a similar number and arrangement of horizons, whose color, texture, structure, consistence, thickness, reaction and composition are within a narrowly defined range. Soil series are very often subdivided into phases. Phases of soil series are based on variations of such features as degree of erosion of the profile, topographic change, stoniness, or salinity.

Soil series and soil phases are all three dimensional bodies that occupy a geographic location on the landscape. Since soil is a continuum there are no sharp boundaries between soil series. However, we need to identify, sample and describe these bodies so their properties can be compared and predictions made about their use and management. Therefore, limits are placed on the range allowed in the characteristics that differentiate these bodies. These limits are wide enough to permit delineation of soil series over a practical sized area on a map. Usually, it is impractical to draw exact boundaries between the limits of one soil series and another because of time and mapping scale limitations. Consequently, each delineated area may contain small segments comprising less than 15 percent of other soil series. It can be seen, that the concept of a soil series as a taxonomic unit is related to, but is not strictly speaking, the same as the soil body delineated on a map. Therefore, the soil area delineated on the map is designated as a soil series mapping unit.

For sampling purposes, the minimum size of a soil body representing a Soil Series has recently been defined as the pedon. This varies, but may often be one square meter in areal extent. The pedon is, however, too small to be represented on a map and the Soil Series Mapping Unit can therefore, be regarded as being composed of several contiguous pedons or polypedons whose properties may be individually different but usually within the range defined for a given Soil Series.

There are, thus, differences between taxonomic units, sampling units and mapping units. Each may be termed Soil Series. The taxonomic unit really is the soil profile - it is two dimensional in that the profile can be represented as a vertical slice through all the soil layers at one point on the landscape. The pedon is the sampling unit which really is the test pit used to define the in situ characteristics of that profile, to obtain samples for laboratory testing and to adequately express these characteristics as an average for a specified volume at one point on the landscape. The third unit, the mapping unit, is also three dimensional but instead of representing one point on the landscape, it actually represents a segment of the landscape. It is also implied that everywhere in that delineated landscape segment the actual sequence of soil layers is the same as those exhibited in the test pit and those described and classified in the soil profile. The whole purpose of this is to predict the behaviour or performance of these landscape units when subjected to given sets of management systems.

Generally, mapable differences in any property or group of properties that have significance in soil formation or plant growth are the basis for separating soil series. Differences in soil parent material, drainage, topographic variation and textural variation have been the key characteristics employed to differentiate soil series mapping units in the area. These mapping units form a very useful basis for evaluating and predicting behavior of soils for such purposes as growing agricultural crops, engineering projects and planning for community. A discussion of these evaluations and interpretations of the soils in the map area are found in Part IV of this report.

A summary of the classification of soils in the area is presented in Table 2 and a key relating the soils and their hectarage to their parent materials is presented in Table 3

3.4 DESCRIPTIONS OF SOIL SERIES

The soil series for the area are described in alphabetical order and include a general description of the genetic profile type, texture, parent material, topography and drainage. A general statement on the distribution, surface runoff, stoniness and vegetation characteristics of the series is presented. Chemical, physical, and engineering analyses for a majority of the soil series are given in Appendix F. Further information on the suitability and management of each soil for agriculture, engineering properties and their properties in relation to recreational development is given in Section 4 of this report.

TABLE 2

Classification of Soils in the Area According to the System of Soil Classification for Canada (1978 revised)

Order	Great Group	Subgroup	Family	Series
Brunisolic Soils Well to imperfectly drained soils developed under mixed forest vegetation with brownish colored Bm horizon. It includes soils of various colors with both Ae horizons and weakly expressed B horizons of accumulations of either clay or amorphous compounds. Soils having a Bt horizon less than 5 cm thick are part of this order.	Eutric Brunisols Soils with organic surface horizons (L-H), with a brownish Bm horizon, a weakly acid to mildly alkaline solum, but without a distinct mineral-organic (Ah) surface horizon, pH is greater than 5.5 in the solum.	Eluviated Eutric Brunisol Profile type: LFH, Ae or Aej, Bm or Btj, C or Ck	Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Pine Ridge
		Gleyed Eluviated Eutric Brunisol Profile type: LFH, Ae or Aej, Bmgj or Btjgj, Cgj or Cg	Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Pansy
	Dystric Brunisols Soils with organic surface horizons (L-H), with a brownish Bm horizon, a weakly acid to mildly alkaline solum, but without a distinct mineral organic (Ah) surface horizon, pH is less than 5.5.	Eluviated Dystric Brunisol Profile type: LFH, Ae or Aej, Bm, or Bfj, C	Sandy, mixed, weakly calcareous, cold to moderately cold, subhumid	Sandilands
		Gleyed Eluviated Dystric Brunisol Profile type: LFH, Ae or Aej, Bmgj or Bfjgj, Cgj or Cg.	Sandy, mixed, weakly calcareous, cold to moderately cold, subhumid	Lonesand
Chernozemic Soils Soils with chernozemic Ah horizons more than 10 cm thick and with B or C horizons of high base saturation divalent cations, calcium usually being dominant. Well to imperfectly drained soils developed under xero or mesophytic grasses and forbs under grassland forest transition.	Black Soils Soils with Ah or Ap horizon with dry color Munsell values darker than 3.5. Usually associated with mesophytic vegetation of grasses and forbs.	Gleyed Black Profile type: Ah, (Ap), Bmgj, Ckgj, (Ccagj)	Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, subhumid	Scanterbury
		Gleyed Rego Black Profile type: Ah, Ckgj	Coarse loamy over clayey, strongly calcareous, cold to moderately cold, subhumid	Glenella
			Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Lenswood
			Clayey over loamy, montmorillonitic, strongly calcareous, cold to moderately cold, subhumid	Marquette
			Fine loamy over clayey, mixed, strongly calcareous, cold to moderately cold, subhumid	Niverville
			Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, subhumid	Red River
		Gleyed Solonetzic Black Profile type: Ah, Ae, Bnjtjgj, Ckgj, Csgj	Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, subhumid	Morris

Order	Great Group	Subgroup	Family	Series
	Dark Gray Soils These soils have a leaf mat (L-H) overlying gray to dark gray (Munsell value 3.5 to 5.5 dry, chroma less than 1.5), A horizons. The B horizon is moderately developed, dark brown, coarse granular to blocky and contains concentrations of clay.	Orthic Dark Gray Profile type: Ahe, Ae, Bm or Btj or Bt, Cca or Ck	Loamy, mixed, carbonatic, cold to moderately cold, subhumid	Aneda
			Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Davidson
			Sandy skeletal over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Gunton
			Sandy skeletal, mixed, strongly calcareous, cold to moderately cold, subhumid	Leary
		Gleyed Dark Gray Profile type: Ahe, Bmgj, Ckgj	Sandy skeletal over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Beaverdam
			Sandy over clayey, mixed, strongly calcareous, cold to moderately cold.	Giroux
			Coarse loamy over clayey, mixed, strongly calcareous, cold to moderately cold.	Greenwald
			Loamy, mixed, carbonatic, cold to moderately cold, subhumid	Inwood
			Sandy skeletal, mixed, strongly calcareous, cold to moderately cold	Kergwenan
			Clayey, montmorillonitic, strongly calcareous, cold to moderately cold	Kiplin
			Coarse loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Ladywood
			Loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Nourse
			Clayey over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Peguis
			Sandy over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Pelan
			Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid.	Poppleton
			Loamy, mixed, strongly calcareous, cold to moderately cold, subhumid.	Woodmore
		Gleyed Rego Dark Gray Profile type: Ahe, Ckgj	Sandy skeletal, mixed, strongly calcareous, cold to moderately cold, subhumid.	Spearhill
		Gleyed Solonetzic Dark Gray, Profile type: Ahe, Ae, Bnjtjgj, Ckgj, Csgj	Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, subhumid	Thalberg

Order	Great Group	Subgroup	Family	Series
Gleysolic Soils Poorly drained soils which may have an organic horizon, an Ah horizon, or both, or neither of these horizons. The sub-soils show gleying and are dull colored, but may have brighter colored prominent mottles. Soils associated with wetness. They have developed under various climatic and vegetative conditions and in the presence of a high fluctuating watertable.	Humic Gleysol Soils Soils with an Ah horizon more than 10 cm thick under virgin conditions. When cultivated to a depth of 15 cm, they have an Ap layer with more than 2 percent organic carbon. They lack Bt horizons.	Rego Humic Gleysol Profile type: LFH or O, Ah, Cg	Fine loamy, mixed, carbonatic, cold to moderately cold, aquic	Balmoral
			Sandy skeletal over loamy, mixed, strongly calcareous, cold to moderately cold, aquic	Berry Island
			Coarse loamy, mixed, strongly calcareous, cold to moderately cold, aquic	Foley
			Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, aquic	Fyala
			Clayey over loamy, strongly calcareous, cold to moderately cold, aquic	Kline
			Coarse loamy, mixed, carbonatic, cold to moderately cold, aquic	Lambert
			Sandy, mixed, strongly calcareous, cold to moderately cold, aquic	Malonton
			Coarse loamy, mixed, strongly calcareous, cold to moderately cold, aquic	Marchand
			Coarse loamy over clayey, mixed, strongly calcareous, cold to moderately cold, aquic.	McKinley
			Loamy, mixed, carbonatic, cold to moderately cold, aquic.	Meleb
			Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, aquic.	Osborne
			Clayey over loamy, montmorillonitic, strongly calcareous, cold to moderately cold, aquic	Partridge Creek
			Fine loamy over loamy, mixed, strongly calcareous, cold to moderately cold, aquic.	Pineimuta
			Sandy over clayey, mixed, strongly calcareous, cold to moderately cold, aquic.	Prawda
			Sandy over loamy, mixed, strongly calcareous, cold to moderately cold, aquic.	Sprague
			Sandy skeletal, mixed, strongly calcareous, cold to moderately cold, aquic.	Sundown
			Loamy, mixed, strongly calcareous, cold to moderately cold, aquic.	Weiden

Order	Great Group	Subgroup	Family	Series
Luvisolic Soils Well and imperfectly drained soils developed under forest or heath having light colored eluviated horizons and illuvial horizons with accumulations of dominantly translocated clay that are at least 5 cm thick.	Gray Luvisol Soils Soils with thin organic layers (L-H), with light colored eluviated horizons and with illuviated horizons in which clay is the main accumulation product. The solum generally has a medium to high degree of base saturation. Mean annual soil temperature is less than 8°C.	Orthic Gray Luvisol Profile type: LFH, Ae, AB, Bt, C or Ck	Loamy, mixed, carbonatic, cold to moderately cold, subhumid	Garson
			Sandy skeletal over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Long Point
			Sandy over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	St. Labre
			Sandy skeletal, mixed, strongly calcareous, cold to moderately cold, subhumid	Woodridge
		Dark Gray Luvisol Profile type: LFH, Ah or Ahe, Ae, BC, C or Ck	Sandy skeletal over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Gull Lake
			Sandy skeletal, mixed, strongly calcareous, cold to moderately cold, subhumid	Venlaw
			Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Zhoda
		Gleyed Gray Luvisol Profile type: LFH, Ae, Btgj, Cg	Sandy over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Caliento
			Loamy, mixed, carbonatic, cold to moderately cold, subhumid	Piney
			Sandy skeletal, mixed, strongly calcareous, cold to moderately cold, subhumid	Sirko
			Sandy skeletal over loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	Vita
			Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Wintergreen
		Gleyed Dark Gray Luvisol Profile Type:	Sandy, mixed, strongly calcareous, cold to moderately cold, subhumid	Berlo

Order	Great Group	Subgroup	Family	Series
Organic Soils Soils that have developed dominantly from organic deposits that are saturated for most of the year and contain 30% or more of organic matter to: a) a depth of at least 60 cm if the surface layer consists dominantly of fibric moss; or b) a depth of at least 40 cm for other kinds or mixed kinds of organic material; or c) a lithic contact if it occurs at depths greater than 10 cm.	Fibrisol Organic soils with a dominantly fibric middle tier, or middle and surface tiers if a terric or lithic contact occurs in the middle tier.	Typic Fibrisol These soils consist of uniform fibric organic matter derived from Sphagnum mosses throughout the middle and bottom tiers. They lack subdominant mesic and humic layers. They lack terric, lithic, hydric or other layers in the control section. Common horizon sequence: Of or Om, Of	Sphagnic, dysic, cold, aquic	Julius
	Mesisol These organic soils have a dominantly mesic middle tier, or middle and surface tiers if a terric, or lithic, contact occurs in the middle tier.	Typic Mesisol These soils consist of dominantly mesic material throughout the middle and bottom tiers. The control section lacks any terric, hydric, cumulo or limno layers. Common horizon sequence: Of, Om, or Oh, Om.	Mesic, euic, cold, aquic	Stead
		Terric Mesisol These soils have a terric layer beneath the surface tier. Cumulo or limno layers may be present but other layers are absent. Common horizon sequence: Of, Om, or Oh, Om, C, Om	Mesic, euic, cold, aquic, clayey Mesic, euic, cold, aquic, loamy Mesic, euic, cold, aquic, sandy	Cayer Crane Grindstone Kirero Rat River
		Hydric Mesisol These soils have a hydric layer of water that extends from a depth of not less than 40 cm to a depth more than 160 cm. They may also have humic, cumilic, terric or limnic layers. Common horizon sequence: Of, Om, or Oh, Om, W	Mesic, euic, cold, aquic	Overflowing

Order	Great Group	Subgroup	Family	Series
	Humisol These organic soils have a dominantly humic middle tier, or middle and surface tiers if a terric or lithic contact occurs in the middle tier.	Terric Humisol These soils have a terric layer beneath the surface tier. Cumulo or limno layers may be present but other layers are absent. Common horizon sequence: Om or Oh, Oh, C, Oh	Humic, euic, cold, aquic, sandy	Reed River
			Humic, euic, cold, aquic, clayey	South Junction
Regosolic Soils Well and imperfectly drained soils with good to moderate oxidizing conditions having horizon development too weak to meet the requirements of soils in any other order.	Regosol Soils Well and imperfectly drained soils with good to moderate oxidizing conditions and weak horizon development.	Gleyed Cumulic Regosol Profile type: Cgj, Ahb, Cgj	Coarse loamy, mixed, strongly calcareous, cold to moderately cold, subhumid	La Broquerie
			Clayey, montmorillonitic, strongly calcareous, cold to moderately cold, subhumid	Seine River

TABLE 3

Key to the Soils of the Rural Municipalities of Ste Anne, La Broquerie and part of LGD of Stuartburn and their extent in hectares

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Staurtburn (hectares)
1. Soils developed on extremely calcareous, stony, loamy till				
a) Well drained				
Carson series (Orthic Gray Luvisol)	CSO	4.79	116.15	
Aneda series (Orthic Dark Gray)	AND	357.13	71.37	22.30
b) Imperfectly drained				
Piney series (Gleyed Gray Luvisol)	PIY	273.71		
Inwood series (Gleyed Dark Gray)	IWO	3713.37	3399.29	1492.60
c) Poorly drained				
Meleb series (Rego Humic Gleysol, carbonated phase)	MEB	1626.34	2289.08	2205.12
Meleb series peaty phase (Rego Humic Gleysol carbonated phase)	MEBp	9.30	90.17	110.46
	Subtotal	5984.64	5875.89	3830.48
2. Soils developed on moderately to strongly calcareous sandy to gravelly, stratified beach and outwash deposits overlying stony, extremely calcareous loamy till				
a) Well drained				
Long Point series (Orthic Gray Luvisol)	LGP	80.49		
Gull Lake series (Orthic Dark Gray Luvisol)	GLK	16.59	67.45	
Gunton series (Orthic Dark Gray)	GUO	135.98		41.32
b) Imperfectly drained				
Vita series (Gleyed Gray Luvisol)	VIT	249.03	233.70	
Beaverdam series (Gleyed Dark Gray)	BVR	3960.24	603.22	548.64
c) Poorly drained				
Berry Island series (Rego Humic Gleysol carbonated phase)	BYD	2553.03	291.21	2626.33
Berry Island series, peaty phase (Rego Humic Gleysol carbonated phase)	BYDp	1100.64	46.03	1230.18
	Subtotal	8096.00	2988.87	2626.32

Table 3. Cont'd

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Staurtburn (hectares)
3. Soils developed on moderately to strongly calcareous sandy to gravelly stratified beach and outwash deposits				
a) Well drained				
Woodridge series (Orthic Gray Luvisol)	WOG	666.35	211.92	59.94
Venlaw series (Orthic Dark Gray Luvisol)	VLW		163.52	
Leary series (Orthic Dark Gray)	LRY	1085.65	1034.58	84.56
b) Imperfectly drained				
Sirko series (Gleyed Gray Luvsol)	SIK		384.97	
Kergwenan series (Gleyed Dark Gray)	KRW	269.34	1916.03	80.48
Spearhill series (Gleyed Rego Dark Gray)	SRL		371.65	
c) Poorly drained				
Sundown series (Rego Humic Gleysol carbonated phase)	SUW	20.60	729.50	
Sundown series, peaty phase (Rego Humic Gleysol carbonated phase)	SUWp	546.34	305.45	
	Subtotal	7601.70	5117.62	224.98
4. Soils developed on non calcareous sandy lacustrine in some cases aeolian deposits				
a) Well drained				
Sandiland series (Eluviated Dystric Brunisol)	SDI	89.98	997.12	23.69
b) Imperfectly drained				
Lonesand series (Gleyed Eluviated Dystric Brunisol)	LSD		672.23	
	Subtotal	89.98	1669.35	23.69
5. Soils developed on moderately to strongly calcareous sandy lacustrine deposits				
a) Well drained				
Pine Ridge series (Eluviated Eutric Brunisol)	PRG	622.35	345.97	261.60
Zhoda series (Dark Gray Luvisol)	ZHD		129.09	
Davidson series (Orthic Dark Gray)	DVD	203.34	700.07	8.01
b) Imperfectly drained				
Berlo series (Gleyed Dark Gray Luvisol)	BLO		247.48	
Wintergreen series (Gleyed Gray Luvisol)	WGE	127.69	1374.79	
Pansy series (Gleyed Eluviated Eutric Brunisol)	PAN	174.52	9284.45	1424.56
Poppelton series (Gleyed Dark Gray)	PPL	2610.26	3223.44	2842.47
Lenswood series (Gleyed Rego Black)	LSW			60.63
c) Poorly drained				
Malonton series (Rego Humic Gleysol carbonated phase)	MNT	1832.69	10348.51	3212.18
Malonton series, peaty phase (Rego Humic Gleysol carbonated phase)	MNTp	757.19	4183.51	615.82
Malonton series, drained phase (Rego Humic Gleysol carbonated phase)	MNTd		32.08	
Malonton series, peaty drained phase (Rego Humic Gleysol carbonated phase)	MNTpd		144.69	
	Subtotal	6328.04	30014.08	8425.27

Table 3. Cont'd

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Staurtburn (hectares)
6. Soils developed on moderately to strongly calcareous sandy lacustrine deposits overlying extremely calcareous loamy, stony till				
a) Well drained				
St Labre series (Orthic Gray Luvisol)	SLB	472.34	565.95	94.39
b) Imperfectly drained				
Caliento series (Gleyed Gray Luvisol)	CIO	406.11	427.91	328.73
Pelan series (Gleyed Dark Gray)	PLN	1380.51	2291.53	26.21
c) Poorly drained				
Sprague series (Rego Humic Gleysol carbonated phase)	SPG	528.41	2237.01	3692.30
Sprague series, peaty phase (Rego Humic Gleysol cabonated phase)	SPGp	278.47	183.73	
	Subtotal	3065.84	5706.13	4141.63
7. Soils developed on moderately to strongly calcareous sandy lacustrine deposit overlying moderately to strongly calcareous lacustrine clay				
b) Imperfectly drained				
Giroux series (Gleyed Dark Gray)	GRX	720.67	362.80	
c) Poorly drained				
Prawda series (Rego Humic Gleysol carbonated phase)	PRA	360.68	590.11	
Prawda series, peaty phase (Rego Humic Gleysol carbonated phase)	PRAp	76.52	118.54	
	Subtotal	1157.87	1071.45	
8. Soils developed on very strongly to extremely calcareous coarse loamy to fine loamy lacustrine sediments over moderately to very strongly calcareous sandy lacustrine deposits				
c) Poorly drained				
Lambert series (Rego Humic Gleysol carbonated phase)	LAM		205.77	
Lambert series, peaty phase (Rego Humic Gleysol carbonated phase)	LAMp		591.50	
	Subtotal		797.27	

Table 3. Cont'd

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Staurtburn (hectares)
9. Soils developed on moderately to strongly calcareous, stratified dominantly loamy textured alluvial and lacustrine deposits				
b) Imperfectly drained				
Ladywood series (Gleyed Dark Gray)	LYW	8.07	589.72	
c) Poorly drained				
Foley series (Rego Humic Gleysol carbonated phase)	FOY	65.36	612.84	
Foley series, peaty phase (Rego Humic Gleysol carbonated phase)	FOYp		66.78	
	Subtotal	73.43	1269.34	
10. Soils developed on moderately to strongly calcareous, stratified dominantly loam textured alluvial and lacustrine deposits underlain by extremely calcareous stony loamy till				
b) Imperfectly drained				
Woodmore series (Gleyed Dark Gray)	WOM	103.94	173.59	
c) Poorly drained				
Weiden series (Rego Humic Gleysol carbonated phase)	WDN	155.23	76.26	
	Subtotal	259.17	249.85	
11. Soils developed on moderately to strongly calcareous, stratified dominantly loam textured alluvial and lacustrine deposit overlying strongly calcareous lacustrine clay which is thin underlain by extremely calcareous stony loam till				
b) Imperfectly drained				
Nourse series (Gleyed Dark Gray)	NUS	189.19	121.16	
	Subtotal	189.19	121.16	
12. Soils developed on moderately to strongly calcareous stratified dominantly loam textured alluvial and lacustrine deposits underlain by moderately to strongly calcareous lacustrine clay				
b) Imperfectly drained				
Greenwald series (Gleyed Dark Gray)	GEW	264.00	25.62	
Glenella series (Gleyed Rego Black)	GNL	189.19	43.40	
c) Poorly drained				
McKinley series (Rego Humic Gleysol carbonated phase)	MLI	48.55	71.29	
McKinley series, peaty phase (Rego Humic Gleysol carbonated phase)	MLIp		62.25	
	Subtotal	501.74	202.56	

Table 3. Cont'd

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Stuartburn (hectares)
13. Soils developed on moderately to strongly calcareous loam to clay loam lacustrine sediments				
c) Balmoral series, peaty phase (Rego Humic Gleysol carbonated phase)	BAMp		18.64	
	Subtotal		18.64	
14. Soils developed on moderately to strongly calcareous loam to clay loam lacustrine sediments overlying extremely calcareous stony loamy till				
c) Poorly drained				
Pineimuta series, (Rego Humic Gleysol)	PMU		18.10	
	Subtotal		18.10	
15. Soils developed on moderately to strongly calcareous loam to clay loam lacustrine sediments overlying moderately to strongly calcareous lacustrine clay deposits				
b) Imperfectly drained				
Niverville series (Gleyed Rego Black)	NIV	535.43		
	Subtotal	535.43		
16. Soils developed on moderately to strongly calcareous lacustrine clay				
b) Imperfecty drained				
Thalberg series (Gleyed Solonetzic Dark Gray)	THG		47.24	
Morris series (Gleyed Solonetzic Black)	MRS	56.95		
Scanterbury series (Gleyed Black)	SCY	776.29		
Red River series (Gleyed Rego Black)	RIV	4831.68		
c) Poorly drained				
Osborne series (Rego Humic Gleysol)	OBO	5954.04		
Osborne series, peaty phase (Rego Humic Gleysol)	OBOp	6.33		
Fyala series (Rego Humic Gleysol)	FYL	40.77	49.53	320.75
	Subtotal	11666.06	96.77	320.75

Table 3. Cont'd

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Staurtburn (hectares)
17. Soils developed on moderately to strongly calcareous lacustrine clay underlain by extremely calcareous stony loamy till				
b) Imperfectly drained				
Peguis series (Gleyed Dark Gray)	PGU		156.74	
Marquette series (Gleyed Rego Black)	MRQ	351.56	4.92	
c) Poorly drained				
Kline series (Rego Humic Gleysol)	KLI	500.18		
Partridge Creek series (Rego Humic Gleysol)	PGE	90.15	102.10	
	Subtotal	941.89	263.76	
18. Soils developed on moderately to strongly calcareous sandy to sandy loam alluvial deposits				
b) Imperfectly drained				
La Broquerie series (Gleyed Cumulic Regosol)	LAB	286.44	248.98	337.19
c) Poorly drained				
Marchand series (Rego Humic Gleysol)	MAR	122.76	571.12	317.29
Marchand, peaty phase (Rego Humic Gleysol)	MARp		55.89	
	Subtotal	409.20	875.99	654.48
19. Soils developed on moderately to strongly calcareous clay to clay loam alluvial deposits				
b) Imperfectly drained				
Kiplin series (Gleyed Dark Gray)	KPN	69.51		
Seine River series (Gleyed Cumulic Regosol)	SRE	292.01		
	Subtotal	361.52		
20. Soils developed on poorly to very poorly drained organic deposits				
1. Dominantly moderately decomposed fen peat				
a) 40 to 160 cm of mesic fen peat with little or no (<15 cm) Sphagnum surface peat deposits overlying (i) loamy to clayey lacustrine deposits (ii) extremely calcareous loamy till (iii) sandy lacustrine deposits				
(i) Cayer series (Terric Mesisol)	CAY		39.49	
(ii) Crane series (Terric Mesisol)	CRN		76.33	
(ii) Crane series drained phase	CRNd		18.53	
(iii) Kircro series (Terric Mesisol)	KIC	2478.50	2778.70	3722.03

Table 3. Cont'd

	Map Symbol	Area within R.M. Ste Anne (hectares)	Area within R.M. La Broquerie (hectares)	Area within the[1] 3 townships of the LGD of Stuartburn (hectares)
b) Deep (>160 cm) mesic fen peat with little or no (<15 cm) fibric Sphagnum peat surface. All these soils underlain by (i) undifferentiated materials				
(i) Stead series (Typic Mesisol)	STD	1275.34		99.03
c) Deep (>160 cm) mesic fen peat with a hydric layer occuring between 40-130 cm and underlain by (i) undifferentiated materials.				
(i) Overflowing series (Typic Mesisol aquic phase)	OVO	126.93		
2. Dominantly moderately well decomposed forest peat a) 40 to 160 cm of mesic forest peat with (<65 cm) of fibric Sphagnum surface peat deposits which overlie (i) sandy lacustrine deposits (ii) extremely calcareous till				
(i) Rat River complex (Terric Mesisol*, Terric Mesisol sphagnic phase, Terric Fibric Mesisol)	RTV	237.92	185.87	181.22
(ii) Grindstone complex (Terric Mesisol*, Terric Mesisol sphagnic phase, Terric Fibric Mesisol	GDT	84.91		
3. Dominantly undecomposed Sphagnum peat a) Organic deposits (>160 cm) with a surface layer of fibric Sphagnum (>125 cm) overlying mesic forest or fen peat. Underlain by (i) undifferentiated material.				
(i) Julius complex (Typic Fibrisol*, Mesic Fibrisol, Fibric Mesisol	JUS	190.29		
4. Dominantly well to moderately well decomposed forest peat a) 40 to 160 cm of humic to mesic forest peat which overlie (i) clayey lacustrine deposits (ii) sandy lacustrine deposits				
(i) South Junction series (Terric Humisol)	SUJ	92.63		
(ii) Reed River series (Terric Humisol)	RRV	771.49		
21. Miscellaneous land types				
Water	ZZ		12.70	
	Total Hectares	48369.89	57911.36	28947.17

Aneda Series (AND)

The Aneda series consists of well to moderately well drained Orthic Dark Gray soils developed on very strongly to extremely calcareous, stony glacial till. The surface texture ranges from a sandy loam to loam. The topography is irregular, very gently to gently sloping. Surface runoff is moderate and permeability is medium to moderately slow. The vegetation consists mainly of aspen with occasional burr oak.

The Aneda soil is characterized by a thin neutral slightly acid partially decomposed leaf mat, and a dark gray Ahe horizon of 3 to 10 cm thick and underlain by a dark yellowish brown Bt horizon of 6 to 12 cm thick. The extremely calcareous C horizon is very pale brown and may have a somewhat platy, fissile structure. The Bt horizon is not as well developed as the Garson soil; the characteristics of the subsoil of both series are similar.

Balmoral Series (BAM)

The Balmoral series consists of Rego Humic Gleysol soils developed on strongly calcareous, moderately fine textured sediments under the influence of poor natural drainage. Surface texture varies from loam to silty clay loam. The parent material is extremely calcareous. The topography is level to depressional and drainage is poor to very poor. In most areas, there has been some improvement of the natural drainage with installation of drainage ditches. The native vegetation consists of meadow grasses, reeds, sedges; some clumps of willows and black poplar may also occur.

In its natural state, the Balmoral soil is characterized by a thin (less than 15 cm) layer of moderately decomposed fen peat; a very dark gray granular, Ah horizon 7.5 to 15 cm thick, usually clay loam to silty clay loam in texture, and a thin gray carbonated transition AC horizon and a very pale brown, very strongly to extremely calcareous C horizon. In cultivated areas, the peaty surface layer is either absent due to burning prior to breaking or has been incorporated with the Ah horizon.

Balmoral peaty phase soils consist of Balmoral soils having 15 to 40 cm of mesic herbaceous peat surface.

Beaverdam Series (BVR)

The Beaverdam series consists of imperfectly drained Gleyed Dark Gray soils developed on thin, moderately to strongly calcareous outwash deposits overlying extremely calcareous, stony glacial till. The surface texture ranges from loamy fine sand to loam. A gravelly layer from 10 to 50 cm thick is present above the extremely calcareous till. The topography is level to very gently sloping. The soil drainage is imperfect because of the perched water conditions above the slowly permeable till and to a lateral flow and seepage from the adjacent upland areas. The vegetation consists of dominantly trembling aspen, with some dogwood and occasional bur oak.

The soil is characterized by a dark gray Ahe horizon of 10 to 18 cm thick, and a dark grayish brown Bm or Bt within the coarse gravelly layer; the Bt if present commonly occurs at the contact of the gravelly layer and the till; yellowish brown mottles of iron are present at this contact.

Berlo Series (BLO)

The Berlo series consists of imperfectly drained Gleyed Dark Gray Luvisol soils developed on strongly calcareous deltaic sediments. Surface textures are fine sand to fine sandy loam. These soils occur in small scattered areas, generally bordering gravel beaches or on the margin of lacustrine plains. The topography is level to irregular, very gently sloping. Soil permeability is rapid, but internal drainage is impeded by finer textured substrate of clay or glacial till generally below one meter. A perched water table is present in wet seasons and often reaches the surface during the spring thaw or after prolonged summer rains. The native vegetation consists of aspen-black poplar woods with an undergrowth of willow, meadow-prairie grasses and herbs.

The soils are weakly to moderately degraded. The A horizon consists of a thin dark gray Ah horizon of 5 to 7 cm., and a light gray Ae horizon. The B horizon is dark grayish brown, fine granular and contains a slight accumulation of clay and humus. The lower portion of the A and B are mottled with iron. The soil may be weakly alkaline in reaction or contain lime carbonate due to recharge with lime by period saturation with lime charged water.

Berry Island Series (BYD)

The Berry Island series consists of poorly drained Rego Humic Gleysol carbonated phase soils developed on moderately to strongly calcareous sandy and gravelly outwash or beach deposits overlying extremely calcareous glacial till. The surface textures are variable and range from loamy fine sand to clay loam depending on the amount of inwashing from surrounding areas. The topography is level to depressional; runoff is very slow; permeability is slow. Vegetation consists of sedges, willow, meadow grasses and some black spruce and tamarack.

The Berry Island soil is characterized by a partially decomposed organic layer of 10 to 15 cm thick and underlain by a carbonated, dark gray Ah horizon 5 to 15 cm thick. A lime enrichment layer may be present below the Ah horizon, depending on the depth of occurrence of the gravelly layers, the sandy and gravelly deposits are stratified and usually have yellowish brown mottles of iron present. The underlying loamy till deposits are usually light gray and may have fine to medium yellowish brown mottles. A description of a Berry Island soil is given in Appendix D.

Berry Island, peaty phase consists of soils similar to the Berry Island but has a thicker peat layer (15 to 40 cm of mixed peats) on the surface.

Caliento Series (CIO)

The Caliento series consists of imperfectly drained Gleyed Gray Luvisol soils developed on a mantle of weakly to strongly calcareous sandy sediments overlying very strongly to extremely calcareous loamy glacial till. Surface textures vary from fine or medium sand to loamy fine sand. These soils occur on irregular, gently sloping terrain. Permeability is rapid in the upper sandy sediments and moderate to moderately slow in the till; runoff is slow. A perched water condition exists above the till for short periods in the spring and following heavy rains. These soils are slightly to moderately stony; the degree of stoniness is dependent on the depth of sandy sediments over the till. Native vegetation consists of trembling aspen, rose, wild strawberry, and grasses.

The soils are characterized by an LH, Ahe, Aeg, Btg, IIBCkg and IICkg horizon sequence. The iron stained Aeg varies in thickness depending on the depth of sandy sediments over the till. The Btg occurs in the base of the sandy layer if the sandy sediments are deep or in the upper till if the sandy sediments are shallow. A representative profile of the Caliento series is given in Appendix D.

Cayer Series (CAY)

The Cayer series consists of very poorly to poorly drained Terric Mesisols developed on 40 to 160 cm of mesic fen peat overlying moderately to strongly calcareous loamy to clayey lacustrine sediments. Little or no (less than 15 cm) Sphagnum moss mantles the mesic fen peat. Cayer soils occur in high nutrient (eutrophic), very poorly to poorly drained, depressional to level areas found throughout the map sheet. Native vegetation is dominantly sedges, reed grasses and meadow grasses and aquatic mosses; a woody herbaceous cover of willow and swamp birch occur in areas of better drainage.

Crane Series (CRN)

The Crane series is composed of Terric Mesisol soils developed on 40 to 160 cm of mesic fen peat with less than 15 cm of fibric Sphagnum moss peat at the surface. Extremely calcareous, loamy, moderately stony till occurs within 160 cm of the surface. These poor to very poorly drained soils are located in high nutrient (eutrophic), depressional to level areas. Native vegetation on these soils is sedge, brown moss, and reed grasses with interspersed clumps of swamp birch and willow

The soils of the Crane series differ from the Cayer and Kircro series only in the nature of the underlying mineral substrate. A description of a Crane soil is given in Appendix D.

Davidson Series (DVD)

The Davidson series consists of well to moderately well drained Orthic Dark Gray soils developed on moderately calcareous, sandy, deltaic and beach deposits. Surface textures vary from sandy loam to medium sand. The topography is irregular very gently to gently sloping; runoff is moderate; permeability is rapid. The depth of sand is usually one to two meters to the underlying clay or till. The native vegetation is dominantly aspen with occasional white spruce or jack pine.

The Davidson soil is characterized by a dark gray Ahe horizon 16 to 24 cm thick and a very dark grayish brown Bm horizon. A lime carbonate layer may be present at 30 to 50 cm depth. Internal drainage is satisfactory as indicated by the absence of iron mottling within the meter depth or at the sand-clay or sand-till contact.

Foley Series (FOY)

The Foley series consists of poorly drained Rego Humic Gleysol carbonated phase soils developed on very strongly and extremely calcareous, loamy lacustrine sediments. Surface textures are very fine sandy loam, loam and silt loam and subsurface textures generally become coarser with depth. These soils are level to depressional with very slow surface runoff. While the soils are very permeable, internal drainage is impeded by a high water table. Native vegetation consists of sedges and reed grasses with clumps of willow and alder.

Foley peaty phase soils have a thin (15 to 40 cm) organic surface layer comprised mainly of moderately well decomposed fen peat. A very dark gray, calcareous Ahg horizon occurs below the peaty surface. It is underlain by a traditional AC horizon, gradually fades into the strongly gleyed iron stained, extremely calcareous parent material.

Fyala Series (FYL)

The Fyala series consists of poorly drained Peaty Rego Humic Gleysol soils developed on weakly to moderately calcareous lacustrine clay deposits. Surface texture of cultivated soils is clay, but usually contains a high percentage of peaty material that has been incorporated with the mineral material. Fyala series are clay textured throughout the profile. Internal drainage in these soils is impeded by fine textures and a high ground water table. The soils are stone free.

The Fyala soils have a surface layer of fibrous, medium acid to neutral peat and muck that is 0 to 15 cm thick, underlain by a thin, very dark gray Ah horizon high in organic matter and neutral to mildly alkaline in reaction. The Ah horizon is from 5 to 15 cm thick, but frequently tongues into the Cg horizon to depths of 20 to 30 cm. The Cg horizon is grayish brown to olive gray, contains numerous, large concretions of lime carbonate and is iron stained. A representative profile description of the Fyala series is given in Appendix D.

Garson Series (GSO)

The Garson series consists of moderately well to well drained Orthic Gray Luvisol soils developed on very strongly to extremely calcareous, stony, glacial till. The surface texture varies from loamy fine sand to loam. The topography is irregular very gently to gently sloping. Surface runoff is moderate and permeability is medium to moderately slow. The vegetation consists mainly of aspen with occasional bur oak.

The Garson soil is characterized by a thin neutral to slightly acid leaf mat, a distinct gray Ae horizon 4 to 11 cm thick, and a dark yellowish brown Bt horizon 6 to 10 cm thick. The extremely calcareous C horizon is very pale brown and may have a somewhat platy or fissile structure.

Giroux Series (GRX)

The Giroux series consists of imperfectly drained Gleyed Dark Gray soils developed on moderately to strongly calcareous, coarse textured (sandy) deltaic lacustrine deposits overlying moderately to strongly calcareous, clayey, lacustrine deposits. The surface texture is fine sand to loamy fine sand. The topography is level to very gently sloping; runoff is moderately slow and permeability is moderately rapid in the coarse textured sediments and slow in the underlying clay. The native vegetation consists dominantly of aspen, balsam poplar, willow, dogwood and grasses.

Giroux soils are characterized by a thin partially decomposed leaf mat and a dark gray Ah or Ahe horizon 8 to 15 cm thick, and a pale brown Bm horizon that may have slight accumulation of coatings of clay on the sand grains. Iron mottles are common in the lower B horizon generally increasing in size and abundance with depth.

Glenella Series (GNL)

The Glenella series consists of imperfectly drained Gleyed Rego Black carbonated phase soils developed on dominantly moderately coarse to medium textured sediments overlying fine textured lacustrine clay. The solum is similar to the Plum Ridge series, but have clay sediments within a meter of the surface. The surface texture is dominantly very fine sandy loam, but may vary from loamy very fine sand to sandy clay loam. The topography is level to very gently sloping; runoff is moderately slow to slow: permeability is moderate in upper moderately coarse to medium textured sediments and slow in the underlying clay. In some areas lateral flow of water may occur through the very fine sand strata above the clay. Where the water contains appreciable soluble salts, saline soils may result. The native vegetation consisted of tall prairie grasses with some aspen or willow.

The soil is characterized by a very dark gray strongly to very strongly carbonated Ah horizon 10 to 20 cm thick, a thin transitional AC horizon 7 to 10 cm thick. The underlying stratified sediments often contain less carbonates than the near surface horizons and are mottled; they may have strata which are slightly coarser with loamy very fine to fine sand. The soil description is similar to Plum Ridge series except that moderately calcareous clay occurs within one meter depth.

Greenwald Series (GEW)

The Greenwald series consists of imperfectly drained Gleyed Dark Gray soils developed on moderately to strongly calcareous moderately coarse to medium textured sediments over moderately to strongly calcareous lacustrine clay. These soils are similar to Ladywood series except they have a clay strata occurring within one meter of the surface. The surface textures are variable ranging from very fine sand to clay loam. Topography is level to irregular, very gently sloping; runoff is moderately slow; and permeability is moderately rapid in the upper strata and slow in the underlying clay strata. A temporary saturated condition occurs above the clay strata during the spring and following intensive rains. Native vegetation consists of aspen, hazel, rose, herbs and grasses; within the landscape some willow or occasional bur oak may be noted.

The soil is characterized by a thin leaf and forb layer overlying a dark gray A horizon 10 to 15 cm thick which contains light gray blotches. The dark grayish brown B horizon is fine to medium granular and may contain some translocated clay. The B horizon may also contain some carbonates, mainly as small carbonate sand grains. Weak iron mottles may be present in the solum, but are more distinct in the lower portions of the profile.

Grindstone Series (GDT)

The Grindstone series consists of poorly drained Terric Mesisol organic soils developed on shallow deposits (40-160 cm) of moderately well decomposed forest peat. These soils are underlain by very stony, extremely calcareous, medium textured till within 160 cm of the surface. These soils are composed dominantly of mesic forest peat which is usually slightly acidic and layered with woody debris. Feathermosses, the dominant peat former in these soils decomposes rapidly and more completely, than other materials and imparts a very dark brown to black color to the matrix.

The native vegetation consists mainly of black spruce forest with some larch; the understory is characterized by Labrador tea and feathermosses. Sphagnum species however do occur in some very poorly drained less productive sites.

Gull Lake Series (GLK)

The Gull Lake series consists of well drained Dark Gray Luvisol soils developed on, thin (approximately 25-100 cm) sandy and gravelly outwash or waterworked, moderately to strongly calcareous deposits overlying extremely calcareous, stony, medium textured glacial compact till. The surface textures vary from loamy sand to gravel. The topography is irregular, very gently to gently sloping; surface runoff is moderate and permeability is rapid in the upper deposits and moderate to moderately slow in the underlying sediments. Vegetation consists of bur oak, grasses, herbs, hazelnut, and some aspen.

The Gull Lake series is characterized by a 7 to 12 cm dark gray Ap horizon, with a 5 to 15 cm pale brown Ae horizon, and a 8 to 15 cm light brown Bt horizon which usually terminates at a layer which contains coarser fragments. A transitional BC horizon may be present above the pale brown glacial till 2Ck horizon. The structure of the till varies from weak fine granular-like to somewhat platy-like or angular blocky-like.

Gunton Series (GUO)

The Gunton series consists of well to moderately well drained Orthic Dark Gray soils developed on thin sandy and gravelly outwash or waterworked, moderately to strongly calcareous deposits overlying extremely calcareous stony glacial till. The solum is similar to the Leary series with a surface texture ranging from loamy fine sand to fine sandy loam; the thickness of the coarse to moderately coarse upper layer is 15 to 40 cm and changes abruptly to stratified gravelly and sandy deposits which vary in thickness from 10 to 60 cm. The topography is irregular, very gently to gently sloping; surface runoff is moderate and permeability is rapid in the upper deposits and moderate to moderately slow in the underlying sediments. Vegetation consists of bur oak, grasses, herbs, hazel and some aspen.

The Gunton series is characterized by a thin partially decomposed leaf mat derived from deciduous and grass vegetation, a dark gray Ah or Ahe horizon of variable thickness depending on the uniformity of the coarse to moderately coarse layer, and a brown to dark yellowish brown Bm or Bt horizon which usually terminates at a layer which contains coarser fragments. The underlying loam glacial till is pale brown and varies in structure from weak fine granular to somewhat platy or fissile.

Inwood Series (IWO)

The Inwood series consists of Gleyed Dark Gray soils developed on extremely calcareous, medium textured till. The dominant surface texture is loam but may have loamy fine sand to fine sandy loam in water-worked areas. They occur on the intermediate and lower landscape position on very gently to irregular very gently undulating topography. Runoff is slow; permeability is moderately slow. Near surface water table may be high during the spring of the year. The areas are generally stony; the frequency of stones increases in areas of more severe water working. The native vegetation is dominantly aspen; with some rose, willow, meadow-prairie grasses and herbs.

The Inwood soils are characterized by a shallow solum with a thin LH horizon, a thin Ahe horizon 3 to 7.5 cm thick, a weakly developed Bt horizon 4 to 15 cm thick which grades sharply into the extremely calcareous till. The Inwood soils have loamy glacial till to a considerable depth, but in some locales the till is quite variable ranging from a meter thick to greater than 15 meters. The Inwood soils developed on less than a meter of glacial till is not common, but will be described as an example of some of the sites encountered. The solum described in Appendix D is, however, typical of the normal Inwood soil.

Julius Series (JUS)

The Julius series consists of deep (>160 cm), poorly drained organic soils developed on thick, fibric sphagnum peat overlying forest or fen peat or both. They are underlain by lacustrine sediments of various textures.

The Julius soils are Typic Fibrisols composed dominantly of extremely acid, uniform deposits of fibric sphagnum peat greater than 130 cm deep occurring on treed, domed or raised bog landforms. This soil develops on drainage divide in central parts of peatlands away from the influence of minerotrophic groundwaters. Under such conditions, the rapid growth of sphagnum mosses as well as their fairly high resistance to decomposition, results in significant accumulation of peat and the formation of a raised organic landform. Water samples from these areas are very ombotrophic (nutrient deficient) as the site is above the regional water table and moisture is provided mainly by precipitation. Native vegetation on Julius soils is stunted black spruce, Labrador tea, leather leaf, and Sphagnum moss.

Kergwenan Series (KRW)

The Kergwenan series consists of imperfectly drained Gleyed Dark Gray soils developed on strongly calcareous, sandy and gravelly outwash or beach deposits. The surface texture is usually finer ranging from a fine sandy loam to loam. The topography is very gently sloping to level. Surface runoff is slow; permeability is rapid. Drainage is imperfect because of a fluctuating water table that rises within 50 cm of the surface during the spring or due to lateral seepage. Vegetation consists dominantly of aspen and grasses with some dogwood, balsam poplar and few willows.

The Kergwenan soil is characterized by a thin layer of decomposing leaf litter and grasses, a dark gray Ah to Ahe horizon, 10 to 24 cm thick, and a dark grayish brown to very dark grayish brown Bm or Bt horizon which contains dark yellowish brown mottles. Below the B horizon mottles are common, and a lime carbonate enrichment may occur.

Kiplin Series (KPN)

The Kiplin series are imperfectly drained Gleyed Dark Gray soils developed on strongly calcareous, stratified, alluvial and lacustrine sediments. Textures are variable throughout the profile ranging from fine sand to silty clay. These soils occur in small areas adjacent to the Seine River. Topography is level to irregular very gently sloping. Surface runoff is slow and the soil is moderately pervious.

Kiplin soils are characterized by a thin very dark brown to black leaf and forb mat overlying a 5 to 10 cm dark gray A horizon with blotches of light gray material. The B. horizon contains some translocated clay and is usually neutral in reaction.

Kircro Series (KIC)

The Kircro series consists of very poorly to poorly drained Terric Mesisol soils developed on shallow (40 to 160 cm) deposits of moderately decomposed fen peat. Little or no (less than 15 cm) fibric Sphagnum moss occurs on the surface. The Kircro soils are underlain by strongly calcareous sandy or gravelly sediments within 160 cm of the surface. The Kircro soils occur in high nutrient (eutrophic), very poorly to poorly drained depressional to level areas. Native vegetation is dominantly sedges, brown mosses, and reeds, with willow and swamp birch occuring on local sites having better drainage.

Kline Series (KLI)

The Kline series consists of poorly drained Rego Humic Gleysol soils developed on thin, fine textured, moderately to strongly calcareous lacustrine deposits overlying stony, extremely calcareous loamy glacial and water-modified till deposits. They occupy the level to depressional sites in the transition belt between the lacustrine and high lime glacial till soils. Runoff is very slow, and permeability is very slow. The natural vegetation is dominantly meadow grasses, sedge with some willow and balsam poplar.

The Kline soils are characterized by a thin partially decomposed organic layer 5 to 15 cm thick, a very dark gray to dark gray Ah horizon 10 to 15 cm thick and a dark gray to olive gray calcareous C horizon; a thin pebble line may be present at the contact of the high lime glacial till in some areas. The solum is similar in properties to the Osborne clay, and the subsoil is similar to the Ckg horizon of the Meleb and Inwood series.

La Broquerie Series (LAB)

The La Broquerie series consists of imperfectly drained Gleyed Cumulic Regosol soils developed on moderately to strongly calcareous, stratified coarse to moderately coarse textured alluvial sediments. These youthful soils occur on the plain and levees of the Seine and Rat Rivers. The surface textures vary from loamy sands to sandy loams. The topography is very gently to gently sloping. Native vegetation consists of aspen, black poplar, willow with some ash, elm and maple.

The soil profile is characterized by a thin weakly expressed Ah horizon of 8 to 12 cm that grades sharply into the stratified alluvial sediments. Under cultivation, the surface colors range from light gray to dark gray. The C horizon is moderately to strongly calcareous, stratified, and may contain darker materials representing former surfaces which have been covered by more recent deposition of sediments. A description of the La Broquerie series is found in Appendix D.

Ladywood Series (LYW)

The Ladywood series consists of imperfectly drained Gleyed Dark Gray soils developed on moderately to strongly calcareous, stratified dominantly loam textured alluvial and lacustrine deposits. These soils are similar to the soils described as Greenwald or Woodmore series, but do not have the clay or till within a meter of the surface. Surface textures are variable ranging from very fine sand to clay loam. Topography is level to irregular very gently sloping. Surface runoff is moderate slow; and permeability is moderate, but often restricted due to a high water table.

The Ladywood soils are characterized by a thin leaf and forb layer overlying a thin dark gray Ah horizon which contains patches of light gray material. The very dark gray to dark gray B horizon usually contains some translocated clay. For an example of the properties of the solum, refer to the Greenwald or Woodmore series; the parent materials to a depth of four feet are similar to the Ladywood series.

Lambert Series (LAM)

The Lambert series consists of poorly drained Rego Humic Gleysol carbonated phase soils developed on strongly to very strongly calcareous, medium textured lacustrine sediments, underlain by moderately to strongly calcareous coarse textured lacustrine deposits. The surface texture ranges from sandy loam to loam. Topography is depressional, level or very gently sloping. The soil drainage is poor because of a lack of runoff, or high water table. Vegetation consists of sedges, reed grasses, with areas of balsam poplar, willow, and dogwood.

The soil is characterized by a very dark gray carbonated Ah horizon 12 to 18 cm thick and a gray carbonated AC horizon. Prominent yellowish brown iron mottles are found in the profile.

Lambert peaty phase also occur and are similar to the Lambert soils except they have a thicker (15 to 40 cm) peaty surface.

Leary Series (LRY)

The Leary series consists of well to excessively drained Orthic Dark Gray soils developed on coarse, gravel beach and outwash deposits. Commonly there is a thin sandy surface mantle over the coarser material and surface textures range from loamy fine sand to sand. The topography is very gently sloping usually in the form of long, low, narrow ridges. Surface runoff is moderate; permeability is rapid to very rapid. Vegetation consists of bur oak, grasses, choke cherries and saskatoons.

The Leary soil is characterized by dark gray Ah or Ahe that is variable in thickness depending on the uniformity of the sandy surface mantle. The brown to dark yellowish brown Bm commences at the contact of a gravelly coarser layer and may have a horizon with slight clay accumulation and clay coating around the pebbles and sand grains. The parent material consists of pale brown, stratified layers of coarse sand gravel. A description of a Leary profile is given in Appendix D.

Lenswood Series (LSW)

The Lenswood series consists of imperfectly drained Gleyed Rego Black carbonated phase soils developed on moderately calcareous, dominantly coarse textured deltaic sediments. The surface textures range from loamy fine sand to fine sandy loam. The topography is level to very gently sloping; runoff is moderate to moderately slow; and permeability is moderately rapid, but may be impeded due to a high water table during part of the year. Clay or till deposits occurring below the one meter depth is partially responsible for the impediment of downward water movement, but some lateral movement from better drained soils also occurs. Native vegetation is mainly aspen, balsam poplar, grasses and willow.

The soil is characterized by a very dark gray carbonated Ah horizon 15 to 40 cm thick, and a transitional AC horizon 6 to 10 cm thick. A lime accumulation zone (Cca) often occurs below the solum.

Lonesand Series (LSD)

The Lonesand series consists of imperfectly drained Gleyed Degraded Dystric Brunisol soils developed on siliceous sandy outwash. The surface texture is loamy fine sand to fine sand. The topography is generally level to irregular, very gently sloping. Surface drainage is slow, and internal drainage is impeded by a high water table.

The Lonesand soil profile has a light gray, iron stained, strongly acid, Aeg horizon and a loose to very friable, brown, strongly acidic, iron stained B horizon with a weak concentration of iron and organic matter. The C horizon is acid to a depth of about 80 to 110 cm where traces of lime carbonate are encountered. A profile description of Lonesand series is given below in Appendix D.

Long Point Series (LGP)

The Long Point series consists of well drained Orthic Gray Luvisol soils developed on moderately to strongly calcareous, coarse sandy to gravelly outwash, beach and stratified drift deposits overlying extremely calcareous, stony, loamy glacial till. There is commonly a thin sandy surface mantle over the gravelly material. The topography is irregular, very gently to gently sloping, surface runoff is moderate and permeability is rapid in the upper deposits and moderate to moderately slow in the underlying sediments. Vegetation consists of bur oak; grasses, herbs, hazelnut and some aspen.

The Long Point series is characterized by a thin 4 to 6 cm LH horizon, with a 5 to 10 cm gray to light gray Ae horizon and a 10 to 15 cm dark yellowish brown Bt horizon which usually terminates at a layer which contains coarser fragments. A transitional BC horizon may be present above the pale brown glacial till 2CK.

Malonton Series (MNT)

The Malonton series consists of poorly drained Rego Humic Gleysol carbonated phase soils developed on moderately to strongly calcareous deltaic and lacustrine sandy sediments. Finer textured sediments may be present near the meter depth.

The surface texture ranges from loamy fine sand to loam. The topography is depressional, level or very gently sloping. The soil drainage is poor because of a lack of runoff, high water table or lateral seepage above the finer textured sediments below the central section. Vegetation consists of sedges, reed grasses, with areas of balsam poplar, willow, dogwood.

The soil is characterized by a very dark gray carbonated Ah horizon 15 to 20 cm thick and a gray carbonated AC horizon. Prominent yellowish brown iron mottles are present. In virgin sites, up to 15 cm of fibric to humic peat may be present.

Malonton peaty phase soils were also mapped in this area. They have a 15 to 40 cm fibric to humic peat surface.

Malonton drained phase was also mapped in the area. These soil have had significant drainage, so as to lower the high seasonal water table to make these soils somewhat similar to the Poppelton series.

Marchand Series (MAR)

The Marchand series consists of poorly drained Rego Humic Gleysol, carbonated phase soils developed on moderately to strongly calcareous, stratified coarse to moderately coarse textured alluvial sediments. They occur in the lower slope position of the stream channels. The upper 25 to 50 cm usually contain strata high in organic matter; textures may range from loamy sand to sandy loams. Shell fragments of aquatic organisms are usually present in these soils. The soils are subject to seasonal inundation, and subsequent water table near the surface. Native vegetation consist of willow, sedge, reeds and aquatic grasses.

The soils are characterized by a partially decomposed leaf and fen peat layer 8 to 15 cm thick, a thin dark gray, strongly calcareous Ah horizon 10 to 20 cm thick and a light brownish gray to light olive gray C horizon with prominent mottles. Thin very dark gray to dark gray strata may be found in the subsequent stratified layers indicating former surfaces. A description of the Marchand series is given in Appendix D.

The Marchand peaty phase also occurs, and are similar to the Marchand soils except they have a thicker (15 to 40 cm) peaty surface.

Marquette Series (MRQ)

The Marquette series consists of imperfectly drained Gleyed Rego Black soils developed on thin, fine textured, moderately to strongly calcareous lacustrine deposits overlying extremely calcareous, medium to moderately fine textured stony glacial till. They occupy the very gently sloping sites in the transition belt between the lacustrine and high lime glacial till soils. Runoff is moderately slow; and permeability is slow. Natural vegetation consisted of tall prairie grasses, herbs and some aspen.

The Marquette soils are characterized by a very dark gray Ah horizon 20 to 40 cm thick, a dark gray to gray AC horizon 8 to 20 cm thick, and an olive gray C horizon in which gypsum crystals may be present. Where the clay mantle is shallow the AC horizon may be partly in the extremely calcareous till. A thin pebbly horizon may be present at the contact of the lacustrine and till deposits. The solum is similar to the Red River clay soil where the clay is deeper, the subsoil is similar to the Ck horizon of the Inwood, Aneda or Garson soils. In some areas, the subsoil consists of a clay till (a mixture of clay and extremely calcareous loamy sediments transported by ice). Similar soils with the clay till were mapped as the Marquette Variant.

McKinley Series (MLI)

McKinley series consists of poorly drained Rego Humic Gleysol, carbonated phase soils developed on strongly calcareous, medium to moderately coarse textured lacustrine and alluvial sediments underlain by moderately calcareous, clayey lacustrine deposits. These deposits are usually stratified. Surface textures range from fine sandy loam to silt loam. They are level to depressional and have very slow surface runoff. While the soils are highly permeable internal drainage is normally impeded by a high water table. These soils are mostly stone-free.

Native vegetation on McKinley soils, are mixed stands of aspen and balsam poplar with a thick cover of shrubs, herbs and grasses.

The McKinley peaty phase is similar to the Meleb series except for the 15 to 40 cm of mesic fen peat on the surface.

Meleb Series (MEB)

The Meleb series consists of poorly drained Rego Humic Gleysol, carbonated phase soils developed on very strongly to extremely calcareous, stony glacial till. A thin peat covering of 0 to 15 cm may be present and underlain by textures ranging from sandy loam to clay due to some inwash or sorting in the level to depressional topographic position. They occur in association with the Garson, Aneda and Inwood soils. The native vegetation is dominantly meadow grasses, sedges and herbs with inclusions of willow, black poplar and some aspen.

The Meleb soil consists of thin layer of fen peat overlying a thin dark gray Ah horizon 6 to 10 cm thick, alkaline and calcareous, and underlain by a light gray to white very strongly to extremely calcareous till. In soils that have had some inwash or sorting, the Ah horizon terminates at the contact of the modified sediments and the till. If the surface mantle is thicker, a thin gravelly or cobble lens may occur at the contact. A representative soil profile of the Meleb loam is given in Appendix D.

The Meleb carbonated peaty phase is similar to the Meleb carbonated series except for the 15 to 40 cm of mesic fen peat on the surface.

Morris Series (MRS)

The Morris series consists of imperfectly drained Gleyed Solonetzic Black soils developed on moderately to strongly calcareous fine textured lacustrine deposits. They occur on level to very gently sloping topography usually adjacent to or intermediate between poorly drained Osborne clay soils and the imperfectly drained Red River or Scanterbury clay soils. Runoff is moderately slow to slow; permeability is very slow and restricted by the columnar and fine subangular blocky to massive, high swelling B horizons.

In the virgin state, these soils are characterized by a shallow dark gray to gray Ah or Ahej horizon 5 to 8 cm thick, a dark gray to gray columnar Bn, horizon 10 to 15 cm thick and an amorphous dark gray to black, waxy Bn2 horizon that breaks into coarse subangular blocky peds. Gypsum may be present on the olive gray to grayish brown weakly mottled C horizon. Under cultivation, most of the columnar Bn1 horizon is incorporated with the Ap horizon. In the moist condition, the Ap is cloddy and breaks under pressure into weak, medium to fine granular peds; in the dry condition, the Ap is cloddy and hard, and breaks with difficulty into coarse clods or rounded blocks.

Niverville Series (NIV)

The Niverville series consists of imperfectly drained Gleyed Rego Black carbonated phase, soils developed on strongly calcareous, medium to moderately fine textured alluvial and lacustrine deposits overlying lacustrine clay within a meter of the surface. The surface texture is variable ranging from loam, silty loam, silty clay loam and silty clay. The topography is level, runoff is slow, and permeability is moderately slow. Some areas are prone to flooding following the spring snow melt. These soils are similar to the Lakeland series, but differ due to the underlying clay strata.

The soil is characterized by a carbonated, very dark gray Ah horizon 15 to 22 cm thick and a carbonated AC horizon 6 to 15 cm thick which may tongue into the C horizon. Occasionally, former surface horizons may be present within the control section. The silty strata usually contains a greater proportion of carbonates than do the layers with less silt.

Nourse Series (NUS)

The Nourse series consists of imperfectly drained Gleyed Dark Gray soils developed on thin moderately to strongly calcareous, moderately coarse to strongly calcareous, moderately coarse to medium textured sediments overlying a significant lacustrine clay strata over extremely calcareous loamy glacial till. These soils are similar to the Greenwald series which has a thicker lacustrine clay strata and absence of the loamy till at or below the meter depth. The surface texture varies from loamy very fine sand to loam. The topography is very gently to gently sloping; runoff is moderate; and permeability is moderately rapid in the surface strata and moderately slow to slow in the clay and till substrata. The native vegetation consists of trembling aspen, balsam poplar, hazel, dogwood, and native grasses.

The soil is characterized by a dark gray A horizon 15 to 25 cm thick, and a brown to dark brown prismatic to granular Bt horizon 10 to 18 cm thick. The solum is usually developed within the moderately coarse to medium textured sediments, but in some cases the Bt may extend into the fine textured sediments. Some pebbles are commonly encountered at the contact below the coarse to moderately coarse textured sediments and below the fine textured sediments.

Osborne Series (OBO)

The Osborne series consists of poorly drained Rego Humic Gleysol soils developed on moderately to strongly calcareous, fine textured lacustrine and alluvial deposits. Drainage is poor because of the depressional topography, runoff is negligible to very slow and permeability is very slow. The native vegetation consists of meadow grasses, sedge, reeds cattails and some willow.

The Osborne soil is characterized by a thin partially decomposed organic layer 5 to 15 cm thick, a very dark gray to dark gray Ah horizon 10 to 18 cm thick, and dark gray to olive gray calcareous C horizon. A thin AC horizon may be present below the Ah that is light gray which has resulted from prolonged saturation and reducing condition. Distinct to prominent mottles may be present in the C horizon.

In the agricultural portions of the area, the Osborne soils have had some improvement in drainage. In a few areas where no drainage has been undertaken Osborne peaty phase soils were mapped. These soils have a 15 to 40 cm thick layer of mesic to humic peat surface.

Overflowing Series (OVO)

The Overflowing series consists of very deep organic soils developed on greater than 160 cm of saturated mesic fen peat with little or no (<15 cm) fibric Sphagnum peat at the surface. A hydric layer occurs between 40 to 130 cm. The Overflowing series is a Hydric Mesisol. These very poorly drained soils are generally underlain by strongly calcareous lacustrine sediments. These areas support dominantly sedges, reeds, and brown mosses. Minor areas of open water and the Stead series a Typic Mesisol may occur within some map units.

The Overflowing soils occur in very poorly drained areas and represent very late stages of lake filling and accumulation of organic deposit.

Pansy Series (PAN)

The Pansy series consists of imperfectly drained Gleyed Eluviated Eutric Brunisol soils developed on moderately to strongly calcareous, sandy deltaic and lacustrine deposits. The texture tends to be fine sand throughout the profile. Topography is generally level to gently sloping. Surface drainage is slow and internal drainage is impeded by a high water table. The native vegetation consists dominantly of aspen with some balsam poplar, dogwood or willow.

The Pansy soil is characterized by a very thin (0 to 2 cm) decomposed leaf mat, a light gray iron stained acidic Aeg horizon, and a friable brownish yellow, acidic B horizon with iron mottling. The iron mottles in the B horizon tend to increase in size and abundance with depth. The C horizon is carbonated and is mottled.

Partridge Creek Series (PGE)

The Partridge Creek series consists of poorly drained Rego Humic Gleysol soils developed on thin (15 to 90 cm), moderately to strongly calcareous lacustrine clay overlying stony, water-modified, extremely calcareous till. They occur in the level to depressional sites in the transitional areas between the lacustrine and high lime glacial till soils. Native vegetation is dominantly sedges, with willow, alder and some balsam poplar.

The Partridge Creek soils have a thin (0-15 cm) surface layer of very dark brown, slightly acid, moderately decomposed fen peat derived from sedges, hydrophytic herbaceous plants and mosses. This thin organic layer is usually underlain by a thin, neutral to mildly alkaline, very dark gray Ah horizon. The Cg horizon is grayish brown, contains numerous large concretions of lime carbonate, is iron stained, and is moderately alkaline.

Pequis Series (PGU)

The Pequis series consists of imperfectly drained Gleyed Dark Gray soils developed on a moderately to strongly calcareous lacustrine clay strata underlain by extremely calcareous loamy glacial till within a meter of the surface. The topography is level to very gently sloping; runoff is moderately slow; permeability is moderately slow in the upper clay strata and moderate to moderately slow in the loamy substrata. The native vegetation consists mainly of aspen, white spruce, hazel, and native grasses.

The soil is characterized by a thin leaf mat 2 to 4 cm, and a dark gray, granular A horizon 3 to 10 cm, and a medium granular dark gray Bt horizon 12 to 25 cm thick, and a gray C horizon. An increase in pebble and stone content may be noticeable at the contact of the clay and loamy till strata.

Pelan Series (PLN)

The Pelan series consists of imperfectly drained Gleyed Dark Gray soils developed on thin moderately to strongly calcareous, coarse textured (sandy) deltaic or lacustrine deposits overlying stony, extremely calcareous glacial till. The surface texture ranges from loamy fine sand to fine sand. A thin stone lime or pebble layer may be present at the contact of the overlay and the high lime till. The topography is level to very gently sloping; permeability is moderate in the surface layers and moderately slow in the subsoil; this results in impeded internal drainage and temporary saturation conditions, following the snow melt period or above normal precipitation. Runoff is slow. Native vegetation consists of dominantly aspen with some balsam poplar, dogwood or willow.

The Pelan soils are characterized by a thin partially decomposed leaf mat and a dark gray Ah or Ahe horizon 8 to 15 cm thick and a brown to pale brown B horizon of variable thickness from 15 to 40 cm thick that may have slight accumulation or coatings of clay on the sand grains. The solum usually is developed within the overlay, but where the overlay is shallow, part of the B horizon occurs at the contact of the extremely calcareous till. A thin pebble layer or stone line is common at this contact; mottles of iron are common at or above this contact zone.

These soils have a similar solum as the Poppleton series. The Poppleton soils have sandy sediments beyond the meter depth while the Pelan soils have extremely calcareous loamy till within the meter depth. The Pelan soils have a coarser overlay than the Woodmore series; the textures of the Pelan are loamy fine sand to fine sand while the Woodmore are dominantly fine sandy loam to loam textured.

A representative profile of the Pelan series is given in Appendix D.

Pineimuta Series (PMU)

The Pineimuta series consists of poorly drained, Rego Humic Gleysol carbonated soils developed on thin, strongly calcareous, moderately fine textured sediments over extremely calcareous loamy till. The surface textures may range from loam to silty clay. The topography is level to depressional; runoff is slow; and permeability is moderately slow, usually impeded by a high water table. The native vegetation consists of sedges, reed grasses and willow.

The Pineimuta soil is characterized by a black to very dark gray, friable carbonated Ah horizon 10 to 25 cm thick and a thin transitional gray to light gray AC horizon; the light gray to white C horizon is stratified with layers of silt loam to silty clay loam sediments. Extremely calcareous, loamy glacial till usually occurs at 50 to 75 cm depth; a thin water-modified pebble line may occur at the surface of the till. The solum is similar in physical and chemical characteristics as the Balmoral series.

Pine Ridge Series (PRG)

The Pine Ridge series consists of well drained Eluviated Eutric Brunisol soils developed on moderately calcareous, sandy, deltaic and lacustrine deposits. Surface textures are loamy fine sand to sand. The topography is very gently sloping to irregular gently sloping. Permeability is rapid. Native vegetation consists dominantly of jack pine.

The Pine Ridge soils are developed on sandy deposits with a very low clay content and consequently, the accumulation in the B horizon is usually very low. Frequently the B horizon is developed in a thin gravel lense comprised of decomposing dolostones coated with silt and clay. Very often, the B horizon is not continuous and the horizon appears as an Aej and Btj or Bm horizon. If a Bt or Btj is present as a minor inclusion in the map area, the Aej is thick often extending 50 cm or more below the surface.

Piney Series (PIY)

The Piney Series consists of imperfectly drained, Gleyed Gray Luvisol soils developed on strongly calcareous glacial till and waterworked till. Surface texture varies from fine sandy loam to clay because of the inclusion of soils with a very thin lacustrine mantle less than 15 cm thick. They occur on low, broad ridges with a smooth, level surface where run-off is slow and internal drainage is moderate to slow. The native vegetation is dominantly aspen with an association of some balsam poplar; shrubs such as dogwood, rose, raspberry and brush-honeysuckle; and a ground cover of northern bedstraw, wild pea, coltsfoot, aster, poison ivy, strawberry, bunchberry, and several species of grass.

In the virgin condition Piney soils are characterized by a thin Aeg horizon overlying a thin, moderately developed textural B horizon that grades abruptly into stony, strongly calcareous till. These soils, with a solum generally less than 20 cm thick, when cultivated have a plow layer consisting of a mixture of A and B horizons; and in some sites the layer may include some limy material from the C horizon.

Poppleton Series (PPL)

The Poppleton series consists of imperfectly drained Gleyed Dark Gray soils developed on moderately to strongly calcareous, coarse textured (sandy) deltaic, lacustrine deposits. The surface texture is fine sand to loamy fine sand. The topography is level to very gently sloping; runoff is moderately slow and permeability is moderately rapid in the surface, but decreases with depth because of the influence of a capillary fringe above a water table. The native vegetation consists dominantly of aspen with some balsam poplar, dogwood or willow.

The Poppleton soil is characterized by a partially decomposed leaf mat 5 to 12 cm thick, a dark gray to gray Ahe horizon 7 to 12 cm thick; a pale brown B horizon that may have slight accumulation or coating of clay on the sand grains. Iron mottles are common in the lower B horizon, generally increasing in size and abundance with depth. Extremely calcareous, loamy glacial till may occurs immediately below the meter depth; some small areas of Pelan soils may be present in areas mapped as Poppleton. A description of the Poppleton series is given in Appendix D.

Prawda Series (PRA)

The Prawda series consists of poorly drained Rego Humic Gleysol carbonated phase soils developed on moderately to strongly calcareous, sandy, deltaic and lacustrine sediments, which is underlain by weakly calcareous clayey lacustrine deposits.

The surface texture range from loamy fine sand to fine sand. The topography is depressional, level to very gently sloping. The drainage is poor due to lack of runoff, perched water table or lateral seepage. Clay substrate makes these soils moister than the Malonton series. Vegetation consists of sedges, reed grasses, balsam poplar, trembling aspen, willow and dogwood.

This soil can have a 0 to 15 cm peat surface, and a very dark gray carbonated Ah horizon (15 to 20 cm thick), and a gray carbonated AC horizon. Prominent yellowish brown iron mottles are present.

When 15 to 40 cm of peat surface occurs, the soil is called a peaty phase of the Prawda series.

Rat River Series (RTV)

The Rat River series consists of poorly drained Terric Mesisol soils developed on shallow (40 to 160 cm) deposits of mesic forest peat underlain by coarse to moderately coarse textured lacustrine sediments. The organic portion has a very thin (<15 cm) fibric moss peat layer, and underlain by dominantly mesic grading into humic forest peat. The mesic forest peat is very dark brown, slightly acid to neutral, fine fibered, sticky material layered with variable amounts of woody debris. This layer grades into black, highly decomposed peat which may be of fen or forest origin. The native vegetation consists of productive stands of black spruce with some tamarack and understory of Labrador Tea, and feathermosses. Sphagnum moss is of limited occurrence being found as small raised hummocks. A description of the Rat River soil is given in Appendix D.

Red River Series (RIV)

The Red River series consists of imperfectly drained Gleyed Rego Black soils developed on moderately to strongly calcareous fine textured lacustrine deposits. The topography is level to very gently sloping; runoff is slow and permeability is slow but may be moderately slow in the lower horizons containing thin varves of silty deposits. Where these silty varves occur, the horizontal permeability is substantially greater than vertical permeability.

The Red River soil is characterized by a very dark gray Ah horizon 13 to 30 cm thick which tongues into the dark grayish brown (moist) or gray (dry) calcareous AC horizon and a gray to olive gray C horizon with fine mottles.

Reed River Series (RRV)

The Reed River series consists of poorly drained Terric Humisols developed on shallow (40to 160 cm) deposits of mesic to humic forest peat. Moderately coarse to coarse textured lacustrine sediments occur within 160 cm. of the surface. The Reed River soils have a very thin (less than 15 cm), fibric mixed moss surface layer, underlain by dominantly well decomposed forest peat, which is slightly acid to neutral. The dominant peat sources in these soils are feathermosses and herbaceous shrubs, which decompose readily into a black to very dark brown, slightly sticky, amorphous material. Varying amounts of logs and woody debris are found layered throughout the soil.

The native vegetation on the Reed River soils is dominantly cedar with various amounts of black spruce and tamarack. The understory is mixed mosses and various herbaceous plants characteristic of better drained upland areas.

St. Labre Series (SLB)

The St. Labre series consists of moderately well to well drained Orthic Gray Luvisol soils developed on moderately to strongly calcareous, moderately coarse to coarse textured deltaic and lacustrine deposits overlying strongly to extremely calcareous loam textured till deposits. The surface layers range from a fine sand to loamy sand and averages about 30 to 60 cm in thickness. The topography is irregular, very gently sloping. Runoff is moderately rapid and permeability is moderately rapid. The native vegetation consists of bur oak, grasses, some aspen, choke cherry, and saskatoon.

The St. Labre soil is characterized by a thin partially decomposed leaf mat, a thick light gray to gray Ae horizon within the sandy overlay and a thin moderately developed textural B horizon either within the sandy layer or in the finer textured substrate. A pebble line may be encountered at the contact of the extremely calcareous loam to clay loam till. A description of the St. Labre series is given in Appendix D.

Sandilands Series (SDI)

The Sandilands series consists of moderately well to well drained Eluviated Dystric Brunisols developed on siliceous sandy outwash deposits. These deposits are usually quite thick and appear to have been reworked by water and wind. The topography is irregular, gently sloping. Internal drainage is very rapid and runoff is negligible. The native vegetation consists dominantly of Jackpine forest with an understory of low ericaceous shrubs, lichens, herbs and grass species.

Sandilands soils have weakly developed horizons distinguished by faint changes in color and reaction. They have a thin discontinuous organic layer, a thin, light brownish gray A horizon, and an indefinite Bm (BFJ) that grades gradually into very pale brown fine sand which may contain slight amounts of lime carbonate below a meter of the surface.

Scanterbury Series (SCY)

The Scanterbury series consists of imperfectly to moderately well drained Gleyed Black soils developed on moderately to strongly calcareous fine textured montmorillonitic lacustrine deposits. The topography is very gently sloping; runoff is moderate to moderately slow; and permeability is slow. The native vegetation consisted of tall prairie grasses and herbs, with some aspen towards the eastern edge of the grasslands proper.

The Scanterbury soil is characterized by a very dark gray, granular clay Ah horizon 15 to 28 cm thick, and a very dark gray to dark grayish brown medium prismatic grading to medium granular to fine subangular blocky Bm horizon 12 to 40 cm thick; fine faint mottles are usually present in the BC and C horizons.

Seine River Series (SRE)

The Seine River series consists of imperfectly drained Gleyed Cumulic Regosol soils developed on moderately to strongly calcareous fine textured lacustrine and alluvial deposits. They occur mainly on the intermediate position between the river bed and upper levees of the Rat and Seine Rivers. They are subject to seasonal flooding during the spring runoff period; otherwise they have moderate runoff, and moderately slow to slow permeability. The native vegetation consists of Manitoba maple, elm, ash, basswood and native grasses.

The soil is characterized by a thin partially decomposed leaf mat 2 to 4 cm thick, and a variable dark gray Ah horizon of 3 to 6 cm thick; the C horizon has a variable texture of silty clay to clay and may have thin former Ah horizons in the stratified layers below.

Sirko Series (SIK)

The Sirko series consists of imperfectly drained Gleyed Gray Luvisol soils developed on moderately to strongly calcareous coarse sandy to gravelly outwash, beach and stratified drift deposits. There is commonly a thin sandy surface mantle over the gravelly material and surface textures range from loamy coarse sand to clay loam. These soils occur throughout the map area but are most common on the beach ridges bordering the lowlands. The topography is level to irregular gently sloping. There is little or no surface runoff as these soils are very permeable, but internal drainage is impeded by a high groundwater table. Native forest consists mainly of aspen, balsam poplar with odd jack pine. Shrubs are mainly dogwood, rose, some alder, willow and raspberry.

In their natural condition Sirko soils are characterized by a thin light brownish gray, acid, Aeg horizon and a textural Btg horizon. These surface horizons are commonly developed partly in the surface sandy mantle and partly in the underlying coarse sand and gravel.

Sprague Series (SPG)

The Sprague series consists of Rego Humic Gleysol, carbonated phase soils developed on moderately to strongly calcareous sandy lacustrine and outwash deposits overlying extremely calcareous, loamy glacial till within one meter of the surface. The texture of the surface horizon varies from sand to fine sandy loam. Surface drainage is slow; water table is at or near the surface for the greater part of the growing season. Some scattered surface stones may be present within the map unit. Native vegetation consists of sedge, reeds, and willow.

The Sprague soils have a fibrous to mucky organic surface layer of 6 to 15 cm and a thin very dark gray, moderately alkaline Ahg horizon 7 to 12 cm thick which overlies the iron stained calcareous parent material. The extremely calcareous loamy till occurs at depths ranging from 30 to 100 cm. The solum is similar to the Malonton series. The underlying loamy till substrates is similar to that described for the related Colby, pelan and Caliento series.

With a greater depth of peat surface (15 to 40 cm), the peaty phase of the Sprague soil is encountered. A description of the Sprague series is given in Appendix D.

Spearhill Series (SRL)

The Spearhill series consists of imperfectly drained Gleyed Rego Dark Gray soils developed on moderately to strongly calcareous sandy and gravelly outwash or beach deposits. The surface texture is usually ranging from a fine sandy loam to loam. The topography is very gently sloping to level. Surface runoff is slow; permeability is rapid. Drainage is imperfect because of a fluctuating water table that rises to within 50 cm of the surface during the spring or due to lateral seepage. Vegetation consists dominantly of aspen and grasses with some dogwood, balsam poplar and few willows.

The Spearhill soil is characterized by a thin layer of decomposing leaf litter and grasses, a dark gray Ah to Ahe horizon 10 to 24 cm thick, and a grayish brown carbonated transitional AC horizon 15 to 25 cm thick.

South Junction Series (SUJ)

The South Junction series consists of poorly drained organic soils developed on shallow (40 to 160 cm) deposits of mesic to humic forest peat, underlain by fine textured lacustrine sediments. The South Junction soils are Terric Humisols composed of dominantly well decomposed forest peat, which is slightly acid to neutral and contains large amounts of logs and woody debris. Feathermosses and herbaceous plants, the dominant sources of peat in the South Junction soils, readily decompose, resulting in a black, fibered to amorphous, slightly sticky material.

The South Junction soils occur on gently sloping mesic swamp landforms at, or near, the margin of peatlands. Native vegetation on the South Junction soils consists of eastern white cedar in various proportions with black spruce and tamarack. The understory is characterized by tall shrubs such as alder and birch, with a ground cover of low herbaceous plants, ericaceous species and mixed mosses.

Stead Series (STD)

The Stead series consists of very deep organic soils developed on greater than 160 cm of mesic herbaceous peat with little (less than 15 cm) or no fibric Sphagnum peat on the surface. These very poorly drained soils are generally underlain by moderately to strongly calcareous loamy to clayey lacustrine sediments at depths below 160 cm. Stead soils, located in depressional to level areas, support a native vegetation which is dominantly sedges, reeds, brown mosses and meadow grasses with scattered clumps of swamp birch and willow.

The Stead series is a Typic Mesisol. Minor areas of the Overflowing series, a Hydric Mesisol, may occur within some map units represented by the Stead series. The Overflowing series usually occurs in areas occurring adjacent to open water.

A representative Stead series profile is described in Appendix D.

Sundown Series (SUW)

The Sundown series consists of poorly drained Rego Humic Gleysol, carbonated phase soils developed on thick, stratified, strongly calcareous sand and gravel deposits which are greater than a meter thick and usually underlain by loamy glacial till. Usually a thin (<15 cm) strata of moderately coarse to fine textured sediments occurs at the surface. They occur in level to depressional areas bordering gravelly beach ridges or in narrow swales. Runoff is very slow, but lateral movement of water through the gravelly layers is common. The vegetation is mainly sedges, meadow grasses and reeds, with scattered clumps of willow, tamarack and black spruce.

The soil is characterized by a moderately decomposed black fen peat layer of 6 to 15 cm thick, and thin (10 to 15 cm) granular, black A horizon and abruptly into the light gray sand and gravel C horizon. The sand and gravel deposits may extend for a considerable depth below the surface.

Sundown peaty phase have been mapped in the area. A 15 to 40 cm layer of mesic fen peat covers the mineral soil surface.

Thalberg Series (THG)

The Thalberg series consists of imperfectly drained Gleyed Solonetzic Dark Gray soils developed on weakly calcareous lacustrine clay. They occur in the level topographic positions; runoff is slow; and permeability is slow to very slow. The native vegetation is dominantly trembling aspen with some balsam poplar and willow.

The soil is characterized by a thin dark gray to gray Ahe horizon 4 to 7 cm thick and a tough columnar structured B horizon grading into massive lower B horizon. The upper part of the columns are usually bleached and degraded. The C horizon is carbonated.

Venlaw Series (VLW)

The Venlaw series consists of well drained Dark Gray Luvisol soils developed on sandy to gravelly outwash, which is moderately to strongly calcareous. The surface textures vary from loamy sand to gravel. The topography is irregular, very gently to gently sloping, surface runoff is moderate and permeability is rapid to very rapid. Vegetation consists of bur oak, grasses, herbs, hazelnut, and some aspen.

The Venlaw series is characterized by a 8 to 12 cm dark gray Ap horizon, with a 5 to 15 cm pale brown Ae horizon, and a 8 to 15 cm light brown Bt horizon which usually terminates at a layer which contains coarser fragments. A transitional BC horizon may be present.

Vita Series (VIT)

The Vita series consists of imperfectly drained Gleyed Gray Luvisol soils developed on moderately calcareous, coarse sandy to gravelly outwash, beach and stratified drift deposits which are underlain by extremely calcareous loamy glacial till within 1 m. There is commonly a thin sandy surface mantle over the gravelly material and surface textures range from loamy coarse sand to loam. The topography is level to irregular gently sloping. There is little or no surface runoff as the soils are very permeable, but internal drainage is impeded by a high groundwater table. Native forest consists mainly of aspen, some balsam poplar. Shrubs are mainly dogwood, rose, some alder willow and raspberry.

Weiden Series (WDN)

The Weiden series consists of poorly drained Rego Humic Gleysol, carbonated phase soils developed on thin strongly calcareous, medium to moderately coarse lacustrine deposits over extremely calcareous, stony loamy till. The topography is level to depressional, runoff is slow and permeability is moderate in the moderately coarse to medium deposits and moderately slow in the underlying till. The surface textures range from loamy fine sand to loam. The native vegetation consists of meadow grasses, reeds, sedges; some clumps of willows and black poplar may occur. The Weiden series is very similar to the Foley series except for the till substrate.

The Weiden peaty phase has a 15 to 40 cm layer of mesic fen peat on the surface.

Wintergreen Series (WGE)

The Wintergreen series consists of imperfectly drained, Gleyed Gray Luvisol soils developed on moderately to strongly calcareous, sandy lacustrine and outwash deposits. Surface textures are fine sand to fine sandy loam. The topography is level to irregular, very gently sloping. Soil permeability is rapid, but internal drainage is impeded by a high ground water table. Native vegetation is comprised of pure stands of jack pine; mixed jack pine, aspen, balsam poplar, birch; a dense understory of tall and short shrubs like dogwood, rose, alder, raspberry, currant, saskatoon; a profusion of herbs; and some grasses. The soils are stone-free.

The soil is characterized by a thin 2 to 5 cm leaf litter, and a 8-12 cm dark yellowish brown Btg with clay coating on the peds and grades through a thin transition area to the C horizon and then to the IIC. A description of the Wintergreen soil is found in Appendix D.

Woodmore Series (WOM)

The Woodmore series consists of imperfectly drained Gleyed Dark Gray soils developed on thin, strongly calcareous, medium to moderately coarse lacustrine deposits over extremely calcareous loamy till. The topography is level to irregular, very gently sloping; runoff is moderate; and permeability is moderate in the moderately coarse to medium deposits and variably moderate to moderately slow in the underlying till. The surface texture ranges from loamy fine sand to loam. The native vegetation consists of trembling aspen, balsam poplar, hazel, native grasses, and occasional willow.

The soil is characterized by a dark gray granular Ap or Ahe horizon 10 to 18 cm thick and a moderately developed dark grayish brown B horizon 7 to 10 cm thick with some thin discontinuous organic and clay coatings on the peds, and grades through a thin transition area to the C horizon or IIC.

Woodridge Series (WOG)

The Woodridge series consists of rapidly drained Orthic Gray Luvisol soils developed on sandy and gravelly beach, and outwash deposits. A thin sand to loamy mantle which ranges from 15 to 25 cm in thickness frequently overlies the coarser sediments. The areas are usually in the form of narrow elongate, gently sloping beach ridges. Native vegetation on Woodridge soils consists of a semi-open stand of jack pine and sparse ground cover of shrubs, herbs and mosses.

These soils are characterized by a very thin, patchy, partially to moderately decomposed organic layer; a pale brown, weakly but usually deeply leached strongly acid, Ae horizon; a dark yellowish brown, weakly developed, slightly acid textural B horizon which usually occurs partly in the sandy surface mantle and partly in the underlying stratified coarse sand and gravel. Where a large percentage of coarse gravel and cobbles prevail the horizons are thinner and the textural B horizon appears to be prominent.

Zhoda Series (ZHD)

The Zhoda series consists of well to moderately well drained Dark Gray Luvisol soils developed on moderately to strongly calcareous, coarse textured (sandy) deltaic and lacustrine deposits. The surface texture is fine sand to loamy fine sand. Topography is very gently sloping to irregular gently sloping. Permeability is rapid. Native vegetation consists dominantly of aspen and jack pine.

The Zhoda soils are developed on sandy deposits with a very low clay content and consequently the accumulation in the B horizon is usually very low. The Zhoda soil has a dark gray Ah, 10-15 cm thick, an pale brown Ae 10 to 20 cm thick, a yellowish brown Bt 5 to 10 cm thick, then grading into the carbonated C horizon.

PART 4

USE AND MANAGEMENT INTERPRETATIONS OF SOILS

This section provides predictions of performance or soil suitability ratings for various uses of soils based on field observations of soil and landscape characteristics, laboratorydata and on observations of soil behavior under specified conditions of land use and management. Suitability ratings or interpretations are intended only to serve as guides for planners and managers. Caution, with an understanding of the limitations of the soil map must be exercised when applying suitability ratings to soil map units. The value ov any rating or interpretation depends upon the nature and composition of individual map unit delineations which in turn depends on the scale of mapping and intensity of ground truthing employed in the survey.

There are two kinds of mapping units employed in the resurvey of soils in Manitoba. They are simple mapping units and compound mapping units.

Simple mapping units are usually occupied by one kind of soil series, the properties of which vary within very narrow limits. Often as not they contain minor inclusions of related but unlike soil types. The proportion of such unlike soils tends to increase as the intricacy of soil pattern increases or as the intensity of ground truthing decreases. In any event, such mapping units are usually named after the dominant soil series and any available information about the soil series is applicable to the entire mapping unit. Predictions concerning soil conditions and behavior can be done confidently.

Compound mapping units on the other hand, usually contain significant proportions of two or more unlike soil series. These soils are related geographically but cannot be mapped or delineated separately because of a combination of such factors as the intricacy of soil pattern, map scale and survey effort. In many compound map units, differences in soil types and other characteristics are strongly contrasting. Dominant, subdominant and minor (if strongly contrasting) soil series are identified and the relative proportion that each occupies within a single map delineation is specified. In compound map units, interpretation or suitability ratings can only be applied to that portion of the mapping unit occupied by each identified soil series. In order to apply interpretations to field conditions, it is essential that users determine where each identified soil series in the mapping unit occurs in the landscape. Information contained in the legend accompanying the soil map and other sections of the report is useful for this purpose.

A second type of compound mapping unit is called a soil complex. This compound mapping unit usually contains two or more related but unlike soil series which occur in unspecified proportions. In most cases, the differences in soil profile and other characteristics are not strongly contrasting. Soil complexes are often employed in the mapping of organic soil areas. In such areas ground truthing is limited to such a degree that the proportions of constituent soil series within each map unit delineation is not possible to determine. Complexes are often used in the mapping of beach and outwash deposits. Here, soil profile variability occurs over such short intervals of distance that they cannot be shown separately nor can their relative proportions be adequately determined in compound units without excessive and expensive ground truth effort. Interpretations applied to such units cannot be employed with the same degree of confidence as in the case of simple or more specifically defined compound mapping units.

In this section, interpretive soil information is provided for the following land use evaluations:

1. Agriculture
   a) dryland farming capability
   b) irrigation suitability
2. Engineering Uses
3. Recreation Uses

4.1 SOIL CAPABILITY FOR AGRICULTURE

Dryland Agriculture

Soil capability classification for dryland agriculture is based on evaluation of both internal and external soil characteristics that influence soil suitability and limitations for agricultural use. In this classification, mineral soils are grouped into capability classes, subclasses and units based on their limitations for dryland farming, risk of damage when the soils are used and the way they respond to management[6]. There are seven capability classes, each of which groups soils together that have the same relative degree of limitation or hazard for agricultural use. The limitation becomes progressively greater from Class 1 to Class 7. The Class indicates the general suitability of the soils for agriculture. The first three classes are considered capable of sustained production of common field crops, the fourth is marginal for sustained arable culture, the fifth is suitable only for improved permanent pasture, the sixth is capable of use only for native pasture while the seventh class is for soils and land types considered incapable of use for arable agriculture or permanent pasture.

Organic soils within the map area are rated for "potential" agricultural capability after the method of Leeson[7]. Capability ratings of organic soils for agriculture must recognize that most organic soils have little or no value for agriculture in their native state and their potential is only achieved through reclamation or development implemented with varying degrees of difficulty. Capability class definitions for organic soils are the same as for mineral soils. They are however, identified on maps and tables with the prefix "O".

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[6] Anon. 1965. Land capability classification for agriculture Report No. 2, Canada Land Inventory, Canada Dept. Regional Economic Expansion, Ottawa. 16 pp.

[7] Leeson, Bruce et al. 1969. An organic soil capability classification for agriculture and a study of the organic soils of Simcoe County, Soil Sci. Dept., Ontario Agricultural College, Guelph, Ontario.

As well as evaluating potential capability, the system attempts to establish the relative degree of difficulty in carrying out reclamation or development on organic soils. Development difficulty ratings recognize that two organic soils may have similar agricultural capability according to their continuing limitations, but one may need much more extensive reclamation than the other. The ratings are based on evaluation of organic soils in their present or natural state, and are important in establishing priorities for the areas of soils to be reclaimed. Three relative degrees of difficulty in overcoming limitations or hazards to use are recognized.

1. *Minor development difficulty*. Only minor reclamation is required to overcome limitations to use of soils rated 1. Minor reclamation is considered to consist of work that can be carried out by a single operator and that does not require cooperation among several. Such operations would include leveling rough surfaces, removing woody surface layers and land clearing.

2. *Major development difficulty, reclamation warranted*. Major reclamation is required for soils rated 2 and is warranted when soil potential is high. Major reclamation requires cooperation between adjoining operators or outside financial assistance, or both. Major reclamation operations include drainage, construction of water control works, or correction of very low or very high pH.

3. *Major development difficulty, reclamation seldom warranted*. Organic soils rated 3 can be developed only through very large reclamation projects. Major reclamation is seldom warranted because the hazards are serious enough to constitute some continuing limitation that reduces the agricultural capability.

Many features of organic soils that affect their agricultural capability also affect the degree of development difficulty experienced in reclaiming them and the costs of maintaining their productive capacity. The features of organic soils important to rating the degree of development difficulty are vegetative cover, excess water, inundation, surface roughness, coarse wood fragments, degree of decomposition and depth of organic materials. The relative limitation that each feature places on reclamation often depends on organic materials and soil types; in other cases, it depends on the physiographic position of the soil area compared with that of other organic and mineral soils.

Soil Capability subclasses are divisions within classes which group soils with similar kinds of limitations and hazards for agricultural use. The various kinds of limitations recognized at the subclass level are defined in Table 4

Soil capability units are divisions within the subclass category that groups soils together that will respond similarly to a given management

A summary of the soils in the area showing their major characteristics and their interpretive classification for dryland agriculture is presented in Table 5

TABLE 4

Agricultural Capability Subclass Limitations

C - Adverse climate: This subclass denotes a significant adverse climate for crop production as compared to the "median" climate which is defined as one with sufficiently high growing season temperatures to bring field crops to maturity, and with sufficient precipitation to permit crops to be grown each year on the same land without a serious risk of partial or total crop failures.

D - Undesirable soil structure and/or low permeability: This subclass is used for soils difficult to till, or which absorb water very slowly or in which the depth of rooting zone is restricted by conditions other than a high water table or consolidated bedrock.

E - Erosion: Subclass E includes soils where damage from erosion is a limitation to agricultural use. Damage is assessed on the loss of productivity and on the difficulties in farming land with gullies.

F - Low fertility: This subclass is made up of soils having low fertility that either is correctable with careful management in the use of fertilizers and soil amendments or is difficult to correct in a feasible way. The limitation may be due to lack of available plant nutrients, high acidity or alkalinity, low exchange capacity, high levels of carbonates or presence of toxic compounds.

I - Inundation by streams or lakes: This subclass includes soils subjected to inundation causing crop damage or restricting agricultural use.

L - Coarse wood fragments: In the rating of organic soils, woody inclusions in the form of trunks, stumps and branches (>10 cm diameter) in sufficient quantity to significantly hinder tillage, planting and harvesting operations.

M - Moisture limitation: This subclass consists of soils where crops are adversely affected by droughtiness owing to inherent soil characteristics. They are usually soils with low water-holding capacity.

N - Salinity: Designates soils which are adversely affected by the presence of soluble salts.

P - Stoniness: This subclass is made up of soils sufficiently stony to significantly hinder tillage, planting, and harvesting operations. Stony soils are usually less productive than comparable non-stony soils.

R - Consolidated bedrock: This subclass includes soils where the presence of bedrock near the surface restricts their agricultural use. Consolidated bedrock at depths greater than 1 meter from the surface is not considered as a limitation, except on irrigated lands where a greater depth of soil is desirable.

T - Topography: This subclass is made up of soils where topography is a limitation. Both the percent of slope and the pattern or frequency of slopes in different directions are important factors in increasing the cost of farming over that of smooth land, in decreasing the uniformity of growth and maturity of crops, and in increasing the hazard of water erosion.

W - Excess water: Subclass W is made up of soils where excess water other than that brought about by inundation is a limitation to their use for agriculture. Excess water may result from inadequate soil drainage, a high water table, seepage or runoff from surrounding areas.

X - Cumulative minor adverse characteristics: This subclass is made up of soils having a moderate limitation caused by the cumulative effect of two or more adverse characteristics which singly are not serious enough to affect the class rating.

TABLE 5. AGRICULTURE CAPABILITY CLASSES FOR SOILS

Map Symbol and Phase	Soil Name	Agricultural* Capability Class [16]	Irrigation Suitability [17]
AND /xx2x	Aneda	3P	3S
AND /xx3x	Aneda	4P	4Sr
AND /xx4x	Aneda	5P	4Sr
AND /xx5x	Aneda	6P	4Sr
BAMp	Balmoral	3W	4D
BLO	Berlo	3M	3SvD
BLO /xx1x	Berlo	3M	3SvD
BVR	Beaverdam Lake	4MW	4SvD
BVR /xx1x	Beaverdam Lake	4MW	4SvD
BVR /xx2x	Beaverdam Lake	4MW	4SvD
BVR /xx3x	Beaverdam Lake	4MW	4SvD
BYD	Berry Island	5W	4DSv
BYD /xx1x	Berry Island	5W	4DSv
BYD /xx2x	Berry Island	5W	4DSv
BYD /xx3x	Berry Island	5W	4DSv
BYD /xx4x	Berry Island	5WP	4DSv
BYDp	Berry Island	6W	4DSv
CAY	Cayer	03W-1	4D
CIO	Caliento	3MW	4Sb
CIO /xx1x	Caliento	3MW	4Sb
CIO /xx2x	Caliento	3MW	4Sb
CIO /xx3x	Caliento	4P	4Sbr
CIO /xx4x	Caliento	5P	4Sbr
CRN	Crane	05WD-1	4D
CRN /xx4x	Crane	05WD-1	4D
CRNd	Crane	05WD-1	4D
DVD	Davidson	4M	3Sq
DVD /xc2x	Davidson	4M	3Sq
DVD /xx3x	Davidson	4MP	3Sq
DVD /xx4x	Davidson	5P	3Sq
FOY	Foley	3W	4D
FOY /xx1x	Foley	3W	4D
FOY /xx3x	Foley	4P	4D
FOYp	Foley	5W	4D
FYL	Fyala	3W	4DSv
GDT	Grindstone	06WD-2	4D
GEW	Greenwald	2W	4Sb
GLK /xc3x	Gull Lake	5M	4Sv
GLK /xx2x	Gull Lake	5M	4Sv
GLK /xx3x	Gull Lake	5M	4Sv

TABLE 5. AGRICULTURE CAPABILITY CLASSES FOR SOILS

Map Symbol and Phase	Soil Name	Agricultural* Capability Class [16]	Irrigation Suitability [17]
GLK /xx4x	Gull Lake	5MP	4Sv
GNL	Glenella	2W	4Sv
GRX	Giroux	3MW	4Sb
GSO /xx2x	Garson	3P	3S
GSO /xx3x	Garson	4P	3S
GSO /xx4x	Garson	5P	3S
GUO	Gunton	4M	4S
GUO /xx4x	Gunton	5P	4S
IWO /xc3x	Inwood	4P	4Sr
IWO	Inwood	2W	3SD
IWO /xx1x	Inwood	2W	3SD
IWO /xx2x	Inwood	3P	3SD
IWO /xx3x	Inwood	4P	4Sr
JUS	Julius	06WF-2	4D
KIC	Kircro	03W-1	4D
KLI	Kline	3W	4SD
KRW	Kergwenan	4MW	4Sv
KRW /xx1x	Kergwenan	4MW	4Sv
KRW /xx2x	Kergwenan	4MW	4Sv
KRW /xx3x	Kergwenan	4MW	4Sv
KRW /xx4x	Kergwenan	5P	4Sv
LAB	La Broquieire	4I	3D
LAM	Lambert	4W	4D
LAMp	Lambert	5W	4D
LGP	Long Point	4M	4S
LGP /xb3x	Long Point	4P	4S
LRY	Leary	5M	4Sv
LRY /xcxx	Leary	5M	4Sv
LRY /xc1x	Leary	5M	4Sv
LRY /xc2x	Leary	5M	4Sv
LRY /xc3x	Leary	5M	4Sv
LRY /xc4x	Leary	5MP	4Sv
LRY /xx1x	Leary	5M	4Sv
LRY /xx2x	Leary	5M	4Sv
LRY /xx3x	Leary	5M	4Sv
LRY /xx4x	Leary	5MP	4Sv
LRY /xx5x	Leary	6P	4Sv
LSD	Lonesand	4MV	3SvD
LYW	Ladywood	2W	3D
LYW /xx2x	Ladywood	3P	3D

TABLE 5. AGRICULTURE CAPABILITY CLASSES FOR SOILS

Map Symbol and Phase	Soil Name	Agricultural* Capability Class [16]	Irrigation Suitability [17]
LYW /xx3x	Ladywood	4P	3D
MAR	Marchand	6IW	4D
MARp	Marchand	6IW	4D
MEB	Meleb	5W	4D
MEB /xx1x	Meleb	5W	4D
MEB /xx2x	Meleb	5W	4D
MEBp/xx2x	Meleb	5W	4D
MEB /xx3x	Meleb	5W	4D
MEBp	Meleb	5W	4D
MLI	McKinley	3W	4D
MLIp	McKinley	5W	4D
MNT	Malonton	4W	4D
MNT /xx1x	Malonton	4W	4D
MNT /xx2x	Malonton	4W	4D
MNT /xx3x	Malonton	4W	4D
MNT /xx4x	Malonton	4PW	4D
MNTd	Malonton	3MW	4D
MNTd/xx1x	Malonton	3MW	4D
MNTd/xx2x	Malonton	3MW	3SvD
MNTp	Malonton	5W	4D
MNTp/xx1x	Malonton	5W	4D
MNTp/xx2x	Malonton	5W	4D
MNTp/xx4x	Malonton	5PW	4D
MNTp	Malonton	5W	4D
MRS	Morris	2W	4S
MRQ	Marquette	2W	4Sh
MRQ /xx2x	Marquette	3P	4Sh
NIV	Niverville	2W	4SD
NUS	Nourse	2W	4Sb
OBO	Osborne	3W	4D
OBOp	Osborne	6W	4D
OVO	Overflowing	07W-3	4D
PAN	Pansy	4MW	3SvD
PAN /xx1x	Pansy	4MU	3SvD
PAN /xx2x	Pansy	4MU	3SvD
PGE	Partridge Creek	3W	4D
PGE /xx1x	Partridge Creek	3W	4D
PGU	Peguis	2W	4SD
PGU /xx1x	Peguis	2W	4SD
PIY	Piney	2W	3SD

TABLE 5. AGRICULTURE CAPABILITY CLASSES FOR SOILS

Map Symbol and Phase	Soil Name	Agricultural* Capability Class [16]	Irrigation Suitability [17]
PLN	Pelan	3MW	3SvD
PLN /xx1x	Pelan	3MW	3SvD
PLN /xx2x	Pelan	3MP	3SvD
PLN /xx3x	Pelan	4P	4Sr
PLN /xx4x	Pelan	5P	4Sr
PMU	Pineimuta	4W	4D
PPL	Poppleton	3M	3SvD
PPL /xx1x	Poppleton	3M	3SvD
PPL /xx2x	Poppleton	3MP	3SvD
PPL /xx3x	Poppleton	4P	3SvD
PRA	Prawda	4W	4D
PRAp	Prawda	5W	4D
PRG	Pine Ridge	5M	3Sq
PRG /xcxx	Pine Ridge	5M	3Sq
PRG /xx1x	Pine Ridge	5M	3Sq
PRG /xx2x	Pine Ridge	5M	3Sq
PRG /xx4x	Pine Ridge	5MP	3Sq
RIV	Red River	2W	4SD
RRV	Reed River	04WL-2	4D
RTV	Rat River	04WL-2	4D
SCY	Scanterbury	2W	2SD
SDI	Sandiland	5M	3Sq
SDI /xcxx	Sandiland	5M	3Sq
SDI /xdxx	Sandiland	5M	3Sq
SDI /xd3x	Sandiland	5M	3Sq
SDI /xx1x	Sandiland	5M	3Sq
SIK	Sirko	4M	4Sv
SIK /xx1x	Sirko	4M	4Sv
SLB	St. Labre	4M	3Sv
SLB /xx2x	St. Labre	4M	3Sv
SLB /xx3x	St. Labre	4MP	4Sr
SLB /xx4x	St. Labre	5P	4S
SPG	Sprague	4W	4D
SPG /xx1x	Sprague	4W	4D
SPG /xx2x	Sprague	4W	4D
SPG /xx3x	Sprague	4PW	4D
SPGp/xx3x	Sprague	5W	4D
SPG /xx4x	Sprague	5P	4D
SPGp	Sprague	5W	4D
SRE	Seine River	4I	3D

TABLE 5. AGRICULTURE CAPABILITY CLASSES FOR SOILS

Map Symbol and Phase	Soil Name	Agricultural* Capability Class [16]	Irrigation Suitability [17]
SRL	Spearhill	4MW	4Sv
SRL /xx1x	Spearhill	4MW	4Sv
STD	Stead	04W-1	4D
SUJ	South Junction	04WL-2	4D
SUW	Sundown	5W	4D
SUW /xx1x	Sundown	5W	4D
SUW /xx2x	Sundown	5W	4D
SUWp/xx2x	Sundown	5W	4D
SUWp/xx5x	Sundown	6P	4D
SUWp	Sundown	5W	4D
THG	Thalberg	3D	4S
VIT	Vita	4MW	4SvD
VIT /xx2x	Vita	4MW	4SvD
VIT /xx3x	Vita	4MW	4SvD
VLW	Venlaw	5M	4Sv
VLW /xx2x	Venlaw	5M	4Sv
WDN	Weiden	3W	4D
WDN /xx1x	Weiden	3W	4D
WDN /xx2x	Weiden	3WP	4D
WGE	Wintergreen	4MW	3SvD
WGE /xx2x	Wintergreen	4MW	3SvD
WGE /xx3x	Wintergreen	4MP	4S
WGE /xx4x	Wintergreen	5P	4S
WOG /xc3x	Woodridge	6M	4Sv
WOG	Woodridge	6M	4Sv
WOG /xx1x	Woodridge	6M	4Sv
WOG /xx2x	Woodridge	6M	4Sv
WOG /xx4x	Woodridge	6M	4Svr
WOM	Woodmore	2W	3D
WOM /xx1x	Woodmore	2W	3D
WOM /xx2x	Woodmore	3P	3D
ZHD	Zhoda	4M	3Sq

* Capability class of mineral soils is indicated by a numeral, subclass limitation by alphabetic symbol. Capability classification of organic soils are preceeded by "0" and followed by a - numeral indicating the relative degree of development difficulty.

Irrigation Suitability

Irrigation suitability of soils is determined by evaluating the nature of both internal and external soil characteristics[8]. The classification of soils for irrigation suitability consists of three categories: class, subclass and unit.

The suitability class groups soils having the same relative suitability or degree of limitation or hazard for irrigation use. Four classes are utilized grading from Class 1, which is very good to Class 4, which is poor. The four classes are:

Class 1 - Very good: These are soils of fine sandy loam to clay loam texture which are well suited for irrigation use. The soils have good water retention capacity, good permeability, low salt content, good drainage and low general gradient of land surface.

Class 2 - Good: These are soils of loamy fine sand to light clay texture which are moderately well suited for irrigation use. Slight limitation to use results from soil factors such as water holding capacity, permeability, depth of material, salt content, topographic factors such as slope and pattern or drainage restrictions arising from surface drainage and depth to water table.

Class 3 - Fair: These are coarse or fine textured soils which are fair to marginally suitable because of some unfavorable characteristics that limit production and cause management problems under irrigation use. Soil, topographic or drainage factors are more restrictive than in Class 2.

Class 4 - Poor: These are soils that are considered poor to unsuitable for irrigation use because of severe drainage problems, impermeable geologic material, salinity, very low water holding capacity, very rapid permeability, topography or a combination of these problems.

The suitability subclass identifies soils with similar kinds of limitations and hazards related to both internal and external soil characteristics. The internal characteristics include both permanent and non-permanent properties; the permanent properties are those that will not change over time whereas the non-permanent properties may be altered with time by specific management. The properties which affect irrigation suitability of soil are listed as follows:

1. Internal Characteristics
   a) Permanent - Texture, uniformity and depth of geologic deposit, hydraulic conductivity and water storage capacity
   b) Non-permanent - Structure, drainage, fertility, reaction, salinity, exchangeable sodium
2. External Characteristics

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[8] PFRA. 1964. Handbook for the classification of irrigation land in the prairie provinces. Prepared by Committee of the Canada Dept. of Agriculture. PFRA, Regina, Sask. 92 pp.

a) Topography, erosion, stoniness, vegetative cover

The classification criteria for irrigation suitability are summarized in Table 10 Appendix E. The soils of the area are evaluated for irrigation suitability in Table 5.

4.2 SOIL SUITABILITY FOR SELECTED ENGINEERING USES

This section provides information which can be used by engineers and land use planners concerned with engineering and related geotechnical aspects of soil. It is intended to supplement the information on the soil map with additional data on engineering properties of soils.

The criteria used to evaluate soil suitability for selected engineering and related recreational uses are adopted from guides found in[9], and from guidelines developed by the Soil Conservation Service, United States Department of Agriculture[10], and the Canada Soil Survey, Committee[11].

Definition of Soil Suitability Classes

Evaluation of soil suitability for engineering and recreation uses is based on both internal and external soil characteristics. Four soil suitability classes are used to evaluate both mineral and organic soils and hence, mapping units for selected uses. These ratings express relative degrees of suitability or limitation for potential uses of natural or essentially undisturbed soils. The long term effects of the potential use on the behavior of the soil are considered in the rating.

The four suitability class ratings are defined as follows:

Good - Soils in their present state have few or minor limitations that would affect the proposed use. The limitations would easily be overcome with minimal cost.

Fair - Soils in their present state have one or more moderate limitations that would affect the proposed use. These moderate limitations would be overcome with special construction, design, planning or maintenance.

Poor - Soils in their present state have one or more severe limitations that would severely affect the proposed use. To overcome these severe limitations would require the removal of the limitation or difficult and costly alteration of the soil or of special design or intensive maintenance.

Very Poor - Soils have one or more

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[9] Coen et al. 1977. Soil Survey of Yoho National Park, Canada. Alberta Soil Survey Report No. 37. 208 pp. Alberta Institute of Pedology, University of Alberta, Edmonton, Alberta.

[10] USDA. 1971. Guide for Interpreting Engineering Uses of Soils. Soil Conservation Service, USDA. SCS-45. 87 pp.

[11] CSSC. 1973. Proceedings of the Ninth Meeting of the Canada Soil Survey Committee, University of Saskatchewna, Saskatoon. 357 pp.

features so unfavorable for the proposed use that the limitation is very difficult and expensive to overcome or the soil would require such extreme alteration that the proposed use is economically impractical.

Soil Suitability Subclasses

The basic soil properties that singly or in combination with others commonly affect soil suitability for selected engineering properties and recreation uses are provided in Table 6 These subclass designations serve to identify the kind of limitation or hazard for a particular use.

Guides for Assessing Soil Suitability

Guides for assessing soil suitability for ten engineering related uses are given in Appendix E, Tables 11 to 20. These tables provide as specifically as possible, definitions of the soil properties which result in the specific suitability or degree of limitation. In assessing soil suitability for various engineering uses, the degree of suitability is determined by the most restrictive or severe rating assigned to any one of the listed soil properties. For example, if the suitability is "Good" for all but one soil property and it is estimated to be "Very Poor", then the overall rating of the soil for that selected use is "Very Poor". Suitability of individual soil properties, if estimated to be "Fair" or "Poor", can be accumulative in their effect for a particular use. Judgement is required to determine whether the severity of the combined effects of several soil properties on suitability for a particular use will result in downgrading an evaluation. This is left to the discretion of the interpreter. It is incorrect to assume that each of the major soil properties influencing a particular use has an equal effect. Class limits established for rating the suitability of individual soil properties take this into account. For a selected use, therefore, only those soil properties which most severely limit that use are specified.

Information contained in other sections of the report have been used to rate the soils according to their suitability for ten selected engineering uses in Table 7. When using these interpretations, consideration must be given to the following assumptions:

1. Interpretations are based on predictions of soil behavior under defined conditions of use and management as specified in the preamble to each of Tables 11 through 24 (Appendix E).

2. Soil ratings are based on natural, undisturbed soil.

3. Soil suitability ratings are usually given for the entire soil, but for some uses, they may be based on the limitations of an individual soil horizon or other earthy layer, because of its overriding importance. Ratings rarely apply to soil depths greater than 1 to 2 meters, but in some kinds of soils, reasonable estimates can be given for soil material at greater depths. It should be noted here that the term "soil" has been used throughout the report in the pedologic sense and differs in concept from that commonly used by engineers.

4. Poor and very poor soil ratings do not imply that a site cannot be changed to remove, correct or modify the soil limitations. The

use of soils rated as poor depends on the nature of the limitations, whether or not the soil limitation can be altered successfully and economically, and on the scarcity of good sites.

5. Interpretations of map units do not eliminate the need for on-site evaluation by qualified professionals. Due to the variable nature of soils, and the scale of mapping, small, unmapable inclusions of soils with different properties may be present in an area where a development is planned. The need for or importance of on-site studies depends on the use to be made of the soil and the kinds of soil and soil problems involved.

TABLE 6

Properties Utilized to identify limitations in evaluating soil suitability for selected Engineering and Recreational Uses (Tables 7 and 8)

a	subgrade properties
b	thickness of topsoil
c	coarse fragments on surface
d	depth to bedrock
e	erosion or erodibility
f	susceptibility to frost hazard
g	contamination hazard of groundwater
h	depth to seasonal water table
i	flooding or inundation
j	thickness of slowly permeable material
k	permeability or hydraulic conductivity
l	shrink-swell properties
m	moisture limitations or deficit
n	salinity or sulphate hazard
o	organic matter
p	stoniness
q	depth to sand or gravel
r	rockiness
s	surface texture
t	topographic slope class
u	moist consistence
w	wetness or soil drainage class
z	permafrost

4.3 SOIL SUITABILITY FOR SELECTED RECREATION USES

This section provides interpretations of the soil suitability for recreational development. All types of soil can be used for recreational activities of some kind.

Soils and their properties determine to a large degree, the type and location of recreational facilities. Wet soils are not suitable for campsites, roads, playgrounds or picnic areas. Soils that pond and dry out slowly after heavy rains present problems where intensive use is contemplated. It is difficult to maintain grass cover for playing fields and golf courses on droughty soils. The feasibility of many kinds of outdoor activities are determined by other basic soil properties such as depth to bedrock, stoniness, topography or land pattern, and the ability of the soil to support vegetation of different kinds as related to its natural fertility.

The suitability of the various soil series and phases for selected recreation uses is shown in Table 8. according to four classes, Good, Fair, Poor and Very poor defined previously in the section on Engineering Uses. Subclasses are employed to identify the kind of limitation or hazard for a particular use. An explanation of subclass symbols are provided in Table 6

The guidelines for various recreation uses are presented in Appendix E. Tables 21 to 24 and Table 14.

TABLE 7. SUITABILITY RATINGS OF SOILS FOR SELECTED ENGINEERING USES

Map Symbol and Phase	Soil Name	Top Soil [1]	Sand & Gravel [2]	Road Fill [3]	Permanent Bldgs. With Basements [4]	Local Roads and Streets [5]	Sanitary Trench [6]	Landfill Area [7]	Cover Material [8]	Sewage Lagoons [9]	Septic Fields [10]
AND /xx2x	Aneda	Pb	Va	Fa	Fap	Fa	Fp	G	Fp	Fak	Fk
AND /xx3x	Aneda	Pbp	Va	Fap	Pp	Fap	Pp	G	Pp	Fak	Fk
AND /xx4x	Aneda	Pbp	Va	Pp	Pp	Pp	Pp	G	Pp	Pp	Fk
AND /xx5x	Aneda	Vp	Vp	Vp	Vp	Vp	Vp	G	Vp	Vp	Fk
BAMp	Balmoral	Vw	Va	Vw	Vh	Pw	Vw	Pw	Vw	Vh	Vh
BLO	Berlo	Ps	G	Fw	Pw	Fw	Vs	Vk	Vs	Vk	G
BLO /xx1x	Berlo	Ps	G	Fw	Pw	Fw	Vs	Vk	Vs	Vk	G
BVR	Beaverdam Lake	Psc	Pa	Fw	Pw	Fw	Vh	Vk	Vs	Pak	Ph
BVR /xx1x	Beaverdam Lake	Psc	Pa	Fw	Pw	Fw	Vh	Vk	Vs	Pak	Ph
BVR /xx2x	Beaverdam Lake	Psc	Pa	Fw	Pw	Fw	Vh	Vk	Vs	Pak	Ph
BVR /xx3x	Beaverdam Lake	Psc	Pa	Fpw	Psw	Fpw	Vh	Vk	Vs	Pak	Ph
BYD	Berry Island	Psc	Pa	Pw	Vh	Pw	Vhw	Vhk	Vs	Vhk	Vh
BYD /xx1x	Berry Island	Psc	Pa	Pw	Vh	Pw	Vhw	Vhk	Vs	Vhk	Vh
BYD /xx2x	Berry Island	Psc	Pa	Pw	Vh	Pw	Vhw	Vhk	Vs	Vhk	Vh
BYD /xx3x	Berry Island	Pps	Pa	Pw	Vh	Pw	Vhw	Vkh	Vs	Fkp	Vh
BYD /xx4x	Berry Island	Pps	Ppa	Ppw	Vh	Ppw	Vhw	Vhk	Vs	Vhk	Vh
BYDp	Berry Island	Vw	Ph	Vw	Vhw	Pw	Vhw	Vhk	Vsw	Vhk	Vh
CAY	Cayer	Vw	Va	Vaw	Vaw	Vaw	Vsw	Vkw	Vsw	Vah	Vh
CIO	Caliento	Vb	Pa	Fw	Pw	Fw	Pw	Vk	Vs	Pah	Phg
CIO /xx1x	Caliento	Vb	Pa	Fw	Pw	Fw	Pw	Vk	Vs	Pah	Phg
CIO /xx2x	Caliento	Vb	Pa	Fw	Pw	Fw	Pw	Vk	Vs	Pah	Phg
CIO /xx3x	Caliento	Vb	Pa	Fpw	Ppw	Fpw	Ppw	Vk	Vs	Pah	Phg
CIO /xx4x	Caliento	Vb	Pap	Ppw	Ppw	Pp	Ppw	Vk	Vs	Pah	Phg
CRN	Crane	Vw	Va	Vaw	Vaw	Vaw	Vsw	Vkw	Vsw	Vah	Vh
CRN /xx4x	Crane	Vw	Va	Vaw	Vaw	Vaw	Vsw	Vkw	Vsw	Vah	Vh
CRNd	Crane	Vw	Va	Vaw	Vaw	Vaw	Vsk	Vkw	Vsw	Vah	Vh
DVD	Davidson	Ps	Fa	G	G	G	Vks	Vk	Vs	Vk	Gg
DVD /xc2x	Davidson	Ps	Fap	G	Fp	G	Vks	Vk	Vs	Vk	Gg
DVD /xx3x	Davidson	Ps	Fap	Fp	Pp	Fp	Vks	Vk	Vs	Vk	Gg
DVD /xx4x	Davidson	Ps	Pp	Pp	Pp	Pp	Vks	Vk	Vs	Vk	Gg

TABLE 7. SUITABILITY RATINGS OF SOILS FOR SELECTED ENGINEERING USES

Map Symbol and Phase	Soil Name	Top Soil [1]	Sand & Gravel [2]	Road Fill [3]	Permanent Bldgs. With Basements [4]	Local Roads and Streets [5]	Sanitary Trench [6]	Landfill Area [7]	Cover Material [8]	Sewage Lagoons [9]	Septic Fields [10]
FOY	Foley	Fb	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Vh
FOY /xx1x	Foley	Fb	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Vh
FOY /xx3x	Foley	Pp	Va	Pw	Ppw	Pw	Vw	Pw	Ppw	Ph	Vh
FOYp	Foley	Vw	Va	Vw	Vh	Pw	Vw	Vh	Vw	Ph	Ph
FYL	Fyala	Ps	Va	Paw	Pw	Paw	Vw	Pw	Psw	G	Vh
GDT	Grindstone	Pws	Va	Va	Vaw	Vaw	Vws	Vwh	Vsw	Vah	Vhg
GEW	Greenwald	G	Va	Faw	Pw	Fw	Pw	Pk	Ps	Fk	Pkh
GLK /xc3x	Gull Lake	Psp	Fap	Fp	Pp	Fp	Pp	Vk	Vs	Fak	Fkg
GLK /xx2x	Gull Lake	Ps	Fap	G	Fp	G	Pw	Vk	Vs	Fak	Fkg
GLK /xx3x	Gull Lake	Psp	Fap	Fp	Pp	Fp	Pp	Vk	Vs	Pak	Fkg
GLK /xx4x	Gull Lake	Psp	Pp	Pp	Pp	Pp	Pp	Vk	Vs	Pp	Fkg
GNL	Glenella	G	Va	Fa	Pw	Fw	Ph	Pk	Ps	Fk	Pkh
GRX	Giroux	Pbs	Pa	Pa	Paw	Fw	Psw	Vk	Vs	Pa	Pkh
GSO /xx2x	Garson	Pb	Va	Fa	Fap	Fa	Fp	G	Fp	Fak	Fk
GSO /xx3x	Garson	Pbp	Va	Fap	Pp	Fap	Pp	G	Pp	Fak	Fk
GSO /xx4x	Garson	Pbp	Va	Pp	Pp	Pp	Pp	G	Pp	Pp	Fk
GUO	Gunton	Ps	Fa	Ga	Fa	G	Vks	Vk	Vs	Vk	Fk
GUO /xx4x	Gunton	Pps	Pp	Pp	Pp	Pp	Vks	Vk	Vs	Vk	Fk
IWO /xc3x	Inwood	Pbp	Va	Fap	Php	Faw	Ppw	Fw	Pp	Fak	Ph
IWO	Inwood	Pb	Va	Faw	Pw	Faw	Pw	Fw	G	Fak	Ph
IWO /xx1x	Inwood	Pb	Va	Faw	Pw	Faw	Pw	Fw	G	Fak	Ph
IWO /xx2x	Inwood	Pb	Va	Faw	Pw	Faw	Pw	Fw	Fp	Fak	Ph
IWO /xx3x	Inwood	Pbp	Va	Fap	Php	Faw	Ppw	Fw	Pp	Fak	Ph
JUS	Julius	Pws	Va	Va	Vaw	Vaw	Vws	Vwh	Vsw	Vah	Vhg
KIC	Kircro	Vw	Va	Vaw	Vaw	Vaw	Vsw	Vkw	Vsw	Vah	Vhg
KLI	Kline	Psw	Va	Vw	Vw	Pw	Vw	Pw	Pw	Fa	Vh
KRW	Kergwenan	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
KRW /xx1x	Kergwenan	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
KRW /xx2x	Kergwenan	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
KRW /xx3x	Kergwenan	Pps	Fp	Fpw	Pw	Fpw	Vks	Vk	Vs	Vak	Fhg

TABLE 7. SUITABILITY RATINGS OF SOILS FOR SELECTED ENGINEERING USES

Map Symbol and Phase	Soil Name	Top Soil [1]	Sand & Gravel [2]	Road Fill [3]	Permanent Bldgs. With Basements [4]	Local Roads and Streets [5]	Sanitary Trench [6]	Landfill Area [7]	Cover Material [8]	Sewage Lagoons [9]	Septic Fields [10]
KRW /xx4x	Kergwenan	Pps	Pp	Pp	Pw	Pp	Vks	Vk	Vs	Vak	Fhg
LAB	La Broquieire	Pi	Pah	Fw	Piw	Pi	Pi	Vki	Vs	Vik	Vi
LAM	Lambert	Fb	Pah	Phw	Pw	Pw	Vkw	Vkw	Pw	Vk	Vhg
LAMp	Lambert	Vw	Pah	Phw	Vw	Pw	Vkw	Vkw	Vw	Vkh	Vhg
LCP	Long Point	Ps	Fa	Ga	Fa	G	Vks	Vk	Vs	Vk	Fh
LGP /xb3x	Long Point	Pps	Fp	Fp	Pp	Fp	Vks	Vk	Vs	Vk	Fk
LRY	Leary	Psc	G	G	G	G	Vks	Vk	Vs	Vk	Gg
LRY /xcxx	Leary	Psc	G	G	G	G	Vks	Vk	Vs	Vk	Gg
LRY /xc1x	Leary	Psc	G	G	G	G	Vks	Vk	Vs	Vk	Gg
LRY /xc2x	Leary	Psc	G	G	Fp	G	Vks	Vk	Vs	Vk	Gg
LRY /xc3x	Leary	Ppc	G	Fp	Pp	Fp	Vks	Vk	Vs	Vk	Gg
LRY /xc4x	Leary	Ppc	Pp	Pp	Pp	Pp	Vks	Vk	Vs	Vk	Gg
LRY /xx1x	Leary	Psc	G	G	G	G	Vks	Vk	Vs	Vk	Gg
LRY /xx2x	Leary	Psc	G	G	Fp	G	Vks	Vk	Vs	Vk	Gg
LRY /xx3x	Leary	Ppc	G	Fp	Pp	Fp	Vks	Vk	Vs	Vk	Gg
LRY /xx4x	Leary	Ppc	Pp	Pp	Pp	Pp	Vks	Vk	Vs	Vk	Gg
LRY /xx5x	Leary	Vp	Vp	Vp	Vp	Vp	Vks	Vk	Vps	Vk	Gg
LSD	Lonesand	Pbs	G	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Fhg
LYW	Ladywood	G	Va	Faw	Pw	Fw	Pkw	Pk	G	Pk	Ph
LYW /xx2x	Ladywood	Fp	Va	Faw	Pw	Fw	Pkw	Pk	Fp	Pk	Ph
LYW /xx3x	Ladywood	Pp	Va	Faw	Ppw	Fpw	Pkw	Pk	Pp	Pk	Ph
MAR	Marchand	Vw	Pah	Vw	Vi	Vi	Viw	Vki	Vsw	Vik	Vig
MARp	Marchand	Vw	Pah	Vw	Viw	Vi	Viw	Vki	Vsw	Vik	Vig
MEB	Meleb	Fs	Va	Pw	Va	Pw	Vw	Pw	Pw	Ph	Ph
MEB /xx1x	Meleb	Fs	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Ph
MEB /xx2x	Meleb	Fsp	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Ph
MEBp/xx2x	Meleb	Vw	Va	Vw	Va	Vw	Vsw	Vw	Vsw	Vah	Vh
MEB /xx3x	Meleb	Pp	Va	Pw	Pw	Pw	Vw	Pw	Pwp	Ph	Ph
MEBp	Meleb	Vw	Va	Vw	Va	Vw	Vsw	Vw	Vsw	Vah	Vh
MLI	McKinley	G	Va	Paw	Paw	Paw	Vw	Pw	Pw	Ph	Vkh

TABLE 7. SUITABILITY RATINGS OF SOILS FOR SELECTED ENGINEERING USES

Map Symbol and Phase	Soil Name	Top Soil [1]	Sand & Gravel [2]	Road Fill [3]	Permanent Bldgs. With Basements [4]	Local Roads and Streets [5]	Sanitary Trench [6]	Landfill Area [7]	Cover Material [8]	Sewage Lagoons [9]	Septic Fields [10]
MLIp	McKinley	Vw	Va	Vw	Vw	Paw	Vw	Vw	Vw	Vh	Vkh
MNT	Malonton	Ps	Ph	Pw	Pw	Pw	Vkw	Vk	Vs	Vk	Vhg
MNT /xx1x	Malonton	Ps	Ph	Pw	Pw	Pw	Vkw	Vk	Vs	Vk	Vhg
MNT /xx2x	Malonton	Ps	Ph	Pw	Pw	Pw	Vkw	Vk	Vs	Vk	Vhg
MNT /xx3x	Malonton	Pps	Ph	Pw	Ppw	Pw	Vkw	Vk	Vs	Vk	Vhg
MNT /xx4x	Malonton	Pps	Php	Ppw	Ppw	Ppw	Vkw	Vk	Vs	Vk	Vhg
MNTd	Malonton	Ps	Fa	Fw	Pw	Fw	Vsw	Vk	Vs	Vk	Phg
MNTd/xx1x	Malonton	Ps	Pap	Fw	Pw	Fw	Vkw	Vk	Vs	Vk	Phg
MNTd/xx2x	Malonton	Ps	Fap	Fw	Pw	Fw	Vkw	Vk	Vs	Vk	Phg
MNTp	Malonton	Vw	Pah	Vw	Vw	Pw	Vks	Vkw	Vsw	Vkh	Vhg
MNTp/xx1x	Malonton	Vw	Pah	Vw	Vw	Pw	Vkw	Vk	Vsw	Vkh	Vhg
MNTp/xx2x	Malonton	Vw	Pah	Vw	Vw	Pw	Vkw	Vk	Vsw	Vkh	Vhg
MNTp/xx4x	Malonton	Vw	Pah	Vw	Vw	Ppw	Vkw	Vk	Vsw	Vkh	Vhg
MNTp	Malonton	Vw	Pah	Vw	Vw	Pw	Vks	Vkw	Vsw	Vkh	Vhg
MRS	Morris	Ps	Va	Pa	Paw	Pa	Paw	Fw	Ps	G	Vk
MRQ	Marquette	Ps	Va	Pa	Pw	Pa	Psw	Fk	Ps	Fak	Pk
MRQ /xx2x	Marquette	Ps	Va	Pa	Pw	Pa	Psw	Fk	Ps	Fak	Pk
NIV	Niverville	Fs	Va	Pa	Pw	Pa	Pw	Fw	Fs	Fk	Phk
NUS	Nourse	G	Va	Faw	Pw	Fw	Pw	Pk	G	Fak	Pkh
OBO	Osborne	Ps	Va	Paw	Paw	Paw	Vw	Pw	Psw	G	Vkh
OBOp	Osborne	Vw	Va	Vw	Vaw	Va	Vw	Vw	Vsw	Va	Vkh
OVO	Overflowing	Vws	Va	Va	Vaw	Vaw	Vws	Vwh	Vsw	Vah	Vhg
PAN	Pansy	Pbs	G	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Phg
PAN /xx1x	Pansy	Pbs	G	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Phg
PAN /xx2x	Pansy	Pbs	G	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Fhg
PGE	Partridge Creek	Pws	Va	Pw	Vh	Pw	Vh	Pw	Pws	Fa	Vh
PGE /xx1x	Partridge Creek	Pws	Va	Pw	Vh	Pw	Vh	Pw	Pws	Fa	Vh
PGU	Peguis	Ps	Va	Pa	Pw	Pa	Pw	Fw	Ps	Fka	Phk
PGU /xx1x	Peguis	Ps	Va	Pa	Pw	Pa	Pw	Fw	Ps	Fka	Phk
PIY	Piney	Pb	Va	Faw	Pw	Faw	Pw	Fw	G	Fak	Ph

TABLE 7. SUITABILITY RATINGS OF SOILS FOR SELECTED ENGINEERING USES

Map Symbol and Phase	Soil Name	Top Soil [1]	Sand & Gravel [2]	Road Fill [3]	Permanent Bldgs. With Basements [4]	Local Roads and Streets [5]	Sanitary Trench [6]	Landfill Area [7]	Cover Material [8]	Sewage Lagoons [9]	Septic Fields [10]
PLN	Pelan	Ps	Pa	Faw	Pw	Fw	Pw	Vk	Fs	Pak	Pkh
PLN /xx1x	Pelan	Ps	Pa	Faw	Pw	Fw	Pw	Vk	Fs	Pak	Pkh
PLN /xx2x	Pelan	Ps	Pa	Faw	Pw	Fw	Pw	Vk	Fp	Pak	Pkh
PLN /xx3x	Pelan	Psp	Pa	Faw	PPw	Fpw	Ppw	Vk	Pp	Pak	Pkh
PLN /xx4x	Pelan	Psp	Pap	Pp	Ppw	Pp	Ppw	Vk	Pp	Pak	Pkh
PMU	Pineimuta	Fs	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Vh
PPL	Poppleton	Ps	Fa	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Phg
PPL /xx1x	Poppleton	Ps	Fa	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Phg
PPL /xx2x	Poppleton	Ps	Fa	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Phg
PPL /xx3x	Poppleton	Pps	Fap	Faw	Ppw	Fpw	Vks	Vk	Vs	Vk	Phg
PRA	Prawda	Ps	Ph	Paw	Paw	Paw	Vw	Vk	Vs	Ph	Vhg
PRAp	Prawda	Vw	Pah	Vw	Vh	Paw	Vw	Vkw	Vsw	Vh	Vhg
PRG	Pine Ridge	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
PRG /xcxx	Pine Ridge	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
PRG /xx1x	Pine Ridge	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
PRG /xx2x	Pine Ridge	Vb	G	G	Fp	G	Vks	Vk	Vs	Vk	Gg
PRG /xx4x	Pine Ridge	Vb	Pp	Pp	Pp	Pp	Vks	Vk	Vs	Vk	Gg
RIV	Red River	Ps	Va	Pa	Pa	Pa	Pws	Fw	Ps	G	Vk
RRV	Reed River	Vw	Va	Vaw	Vaw	Vaw	Vsw	Vkw	Vsw	Vah	Vhg
RTV	Rat River	Pws	Va	Va	Vaw	Vaw	Vws	Vwh	Vsw	Vah	Vhg
SCY	Scanterbury	Ps	Va	Pa	Pa	Pa	Pws	Fw	Ps	G	Vk
SDI	Sandiland	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
SDI /xcxx	Sandiland	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
SDI /xdxx	Sandiland	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
SDI /xd3x	Sandiland	Vb	Fp	G	Pp	Fp	Vks	Vk	Vs	Vk	Gg
SDI /xx1x	Sandiland	Vb	G	G	G	G	Vks	Vk	Vs	Vk	Gg
SIK	Sirko	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
SIK /xx1x	Sirko	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
SLB	St. Labre	Ps	Pa	Fa	Fa	Fa	Fs	Vk	Fs	Pak	Pkg
SLB /xx2x	St. Labre	Ps	Pa	Fa	Fap	Fa	Fsp	Vk	Fp	Pak	Fka

TABLE 7. SUITABILITY RATINGS OF SOILS FOR SELECTED ENGINEERING USES

Map Symbol and Phase	Soil Name	Top Soil [1]	Sand & Gravel [2]	Road Fill [3]	Permanent Bldgs. With Basements [4]	Local Roads and Streets [5]	Sanitary Trench [6]	Landfill Area [7]	Cover Material [8]	Sewage Lagoons [9]	Septic Fields [10]
SLB /xx3x	St. Labre	Psp	Pa	Fap	Pp	Fap	Pp	Vk	Pp	Pak	Fkg
SLB /xx4x	St. Labre	Pps	Pap	Pp	Pp	Pp	Pp	Vk	Pp	Pak	Fkg
SPG	Sprague	Ps	Pah	Pw	Pw	Pw	Vw	Vkw	Pw	Pkh	Vh
SPG /xx1x	Sprague	Ps	Pah	Pw	Pw	Pw	Vw	Vkw	Pw	Pkh	Vh
SPG /xx2x	Sprague	Ps	Pah	Pw	Pw	Pw	Vw	Vkw	Pw	Pkh	Vh
SPG /xx3x	Sprague	Pps	Pah	Pw	Ppw	Pw	Vw	Vkw	Ppw	Pkh	Vh
SPGp/xx3x	Sprague	Pps	Pah	Vw	Ppw	Pw	Vw	Vkw	Vw	Vh	Vh
SPG /xx4x	Sprague	Pps	Pap	Ppw	Ppw	Ppw	Vw	Vkw	Ppw	Pkh	Vh
SPGp	Sprague	Ps	Pah	Vw	Pw	Pw	Vw	Vkw	Vw	Vh	Vh
SRE	Seine River	Fs	Va	Faw	Pw	Pa	Pw	Fw	Fs	Ph	Ph
SRL	Spearhill	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
SRL /xx1x	Spearhill	Psc	G	Fw	Pw	Fw	Vks	Vk	Vs	Vak	Fhg
STD	Stead	Vws	Va	Va	Vaw	Vaw	Vws	Vwh	Vsw	Vah	Vha
SUJ	South Junction	Vw	Va	Vaw	Vaw	Vaw	Vsw	Vkw	Vsw	Vah	Vha
SUW	Sundown	Psc	Ph	Pw	Pw	Pw	Vkw	Vk	Vs	Vak	Vhg
SUW /xx1x	Sundown	Psc	Ph	Pw	Pw	Pw	Vkw	Vk	Vs	Vak	Vhg
SUW /xx2x	Sundown	Psc	Ph	Pw	Pw	Pw	Vkw	Vk	Vs	Vak	Vhg
SUWp/xx2x	Sundown	Ps	Ph	Vw	Vh	Pw	Vkw	Vkw	Vsw	Vak	Vhg
SUWp/xx5x	Sundown	Vp	Vp	Vp	Vp	Vp	Vpw	Vkw	Vsw	Vak	Vha
SUWp	Sundown	Ps	Ph	Vw	Vh	Pw	Vw	Vkw	Vsw	Vak	Vhg
THG	Thalberg	Ps	Va	Pal	Pwa	Pa	Pws	Fw	Ps	G	Vk
VIT	Vita	Psc	Pa	Fw	Pw	Fw	Vh	Vk	Vs	Pak	Ph
VIT /xx2x	Vita	Psc	Pa	Fw	Pw	Fw	Vh	Vk	Vs	Pak	Ph
VIT /xx3x	Vita	Psc	Pa	Fpw	Psw	Fpw	Vh	Vk	Vs	Pak	Ph
VLW	Venlaw	Psc	G	G	G	G	Vks	Vk	Vs	Vk	Gg
VLW /xx2x	Venlaw	Psc	G	G	Fp	G	Vks	Vk	Vs	Vak	Gg
WDN	Weiden	G	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Vh
WDN /xx1x	Weiden	G	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Vh
WDN /xx2x	Weiden	Fp	Va	Pw	Pw	Pw	Vw	Pw	Pw	Ph	Vh
WGE	Wintergreen	Pbs	G	Fw	Pw	Fw	Vks	Vk	Vs	Vk	Fhg

TABLE 8. SUITABILITY RATINGS OF SOILS FOR RECREATIONAL USES

Map Symbol and Phase	Soil Name	Play Ground [11]	Picnic Area [12]	Camp Area [13]	Path And Trails [14]	Permanent Bldgs. Without Basements [4]
AND /xx2x	Aneda	Fp	G	Fp	G	Fa
AND /xx3x	Aneda	Pp	Fp	Pp	Fp	Fap
AND /xx4x	Aneda	Pp	Pp	Pp	Pp	Fap
AND /xx5x	Aneda	Vp	Vp	Vp	Vp	Pp
BAMp	Balmoral	Vsw	Vsw	Vsw	Vsw	Pfw
BLO	Berlo	Vs	Vs	Vs	Vs	Fw
BLO /xx1x	Berlo	Vs	Vs	Vs	Vs	Fw
BVR	Beaverdam Lake	Pqw	Pw	Fw	Fw	Fw
BVR /xx1x	Beaverdam Lake	Pqw	Pw	Fw	Fw	Fw
BVR /xx2x	Beaverdam Lake	Pqw	Pw	Fw	Fw	Fsw
BVR /xx3x	Beaverdam Lake	Pqw	Pw	Fpw	Fpw	Fs
BYD	Berry Island	Pw	Pw	Pw	Pw	Pw
BYD /xx1x	Berry Island	Pqw	Pw	Pw	Pw	Pw
BYD /xx2x	Berry Island	Pqw	Pw	Pw	Pw	Pw
BYD /xx3x	Berry Island	Ppw	Pw	Ppw	Pw	Pw
BYD /xx4x	Berry Island	Ppw	Ppw	Ppw	Ppw	Pw
BYDp	Berry Island	Vw	Vw	Vw	Vs	Vw
CAY	Cayer	Vsw	Vsw	Vsw	Vsw	Vsw
CIO	Caliento	Ps	Fsw	Fsw	Fw	Fw
CIO /xx1x	Caliento	Ps	Fsw	Fsw	Fw	Fw
CIO /xx2x	Caliento	Ps	Fsw	Fsw	Fw	Fw
CIO /xx3x	Caliento	Psp	Fsp	Pp	Fwp	Fwp
CIO /xx4x	Caliento	Pps	Pp	Pp	Pp	Fpw
CRN	Crane	Vsw	Vsw	Vsw	Vsw	Vsw
CRN /xx4x	Crane	Vsw	Vsw	Vsw	Vsw	Vsw
CRNd	Crane	Vsw	Vsw	Vsw	Vsw	Vsw
DVD	Davidson	Ps	Pm	Fs	G	G
DVD /xc2x	Davidson	Ps	Pm	Fsp	G	G
DVD /xx3x	Davidson	Psp	Pm	Pp	Fp	Fp
DVD /xx4x	Davidson	Psp	Pmp	Pp	Pp	Fp
FOY	Foley	Pw	Pw	Pw	Pw	Pw
FOY /xx1x	Foley	Pw	Pw	Pw	Pw	Pw
FOY /xx3x	Foley	Ppw	Pw	Pw	Pw	Pw
FOYp	Foley	Vsw	Vsw	Vsw	Vsw	Pw
FYL	Fyala	Psw	Psw	Psw	Psw	Paw
GDT	Grindstone	Vsw	Vsw	Vsw	Vsw	Vaw
GEW	Greenwald	Fw	Fw	Fw	Fw	Faw
GLK /xc3x	Gull Lake	Ppq	Fmp	Pp	Fp	Fp
GLK /xx2x	Gull Lake	Ppq	Fm	Fp	Fw	G
GLK /xx3x	Gull Lake	Ppq	Fmp	Pp	Fp	Fp

TABLE 8. SUITABILITY RATINGS OF SOILS FOR RECREATIONAL USES

Map Symbol and Phase	Soil Name	Play Ground [11]	Picnic Area [12]	Camp Area [13]	Path And Trails [14]	Permanent Bldgs. Without Basements [4]
GLK /xx4x	Gull Lake	Ppq	Pp	Pp	Fp	Fp
GNL	Glenella	Fw	Fw	Fw	Fw	Faw
GRX	Giroux	Ps	Fsw	Fsw	Fw	Fw
GSO /xx2x	Garson	Fp	G	Fp	G	Fa
GSO /xx3x	Garson	Pp	Fp	Pp	Fp	Fap
GSO /xx4x	Garson	Pp	Pp	Pp	Pp	Fap
GUO	Gunton	Pq	G	Fw	G	G
GUO /xx4x	Gunton	Ppq	Pp	Pp	Pp	Fp
IWO /xc3x	Inwood	Pp	Fwp	Pp	Fwp	Faw
IWO	Inwood	Fw	Fw	Fw	Fw	Faw
IWO /xx1x	Inwood	Fw	Fw	Fw	Fw	Faw
IWO /xx2x	Inwood	Fpw	Fw	Fpw	Fw	Faw
IWO /xx3x	Inwood	Pp	Fwp	Pp	Fwp	Faw
JUS	Julius	Vsw	Vsw	Vsw	Vsw	Vaw
KIC	Kircro	Vsw	Vsw	Vsw	Vsw	Vaw
KLI	Kline	Pw	Pws	Pws	Pws	Pwa
KRW	Kergwenan	Pqw	Fsw	Fsw	Fw	Fw
KRW /xx1x	Kergwenan	Pqw	Fsw	Fsw	Fw	Fw
KRW /xx2x	Kergwenan	Pqw	Fsw	Fsw	Fw	Fw
KRW /xx3x	Kergwenan	Ppq	Fpw	Pp	Fpw	Fw
KRW /xx4x	Kergwenan	Ppq	Pp	Pp	Pp	Fwp
LAB	La Broquieire	Fis	Fsw	Pi	Fiw	Pi
LAM	Lambert	Pw	Pw	Pw	Pw	Pw
LAMp	Lambert	Vsw	Vsw	Vsw	Vsw	Pw
LGP	Long Point	Pq	G	Fw	G	G
LGP /xb3x	Long Point	Ppq	Fp	Pp	Fp	Fp
LRY	Leary	Pmc	Pm	G	G	G
LRY /xcxx	Leary	Pmc	Pm	G	G	G
LRY /xc1x	Leary	Pmc	Pm	G	G	G
LRY /xc2x	Leary	Pmc	Pm	Fp	G	G
LRY /xc3x	Leary	Ppq	Pm	Pp	Fp	Fp
LRY /xc4x	Leary	Ppq	Pm	Pp	Pp	Fp
LRY /xx1x	Leary	Pmc	Pm	G	G	G
LRY /xx2x	Leary	Pmc	Pm	Fp	G	G
LRY /xx3x	Leary	Ppc	Pm	Fp	Fp	Fp
LRY /xx4x	Leary	Ppc	Pm	Pp	Pp	Fp
LRY /xx5x	Leary	Vp	Vp	Vp	Vp	Pp
LSD	Lonesand	Ps	Vs	Vs	Vs	Fw
LYW	Ladywood	Fw	Fw	Fw	Fw	Faw
LYW /xx2x	Ladywood	Fpw	Fw	Fpw	Fw	Faw

TABLE 8. SUITABILITY RATINGS OF SOILS FOR RECREATIONAL USES

Map Symbol an Phase	Soil Name	Play Ground [11]	Picnic Area [12]	Camp Area [13]	Path And Trails [14]	Permanent Bldgs. Without Basements [4]
LYW /xx3x	Ladywood	Pp	Fpw	Pp	Fpw	Faw
MAR	Marchand	Viw	Viw	Viw	Viw	Vi
MARp	Marchand	Viw	Viw	Viw	Viw	Viw
MEB	Meleb	Pw	Pw	Pw	Pw	Pw
MEB /xx1x	Meleb	Pw	Pw	Pw	Pw	Pw
MEB /xx2x	Meleb	Pw	Pw	Pw	Pw	Pw
MEBp/xx2x	Meleb	Vw	Vw	Vw	Pw	Va
MEB /xx3x	Meleb	Pw	Pw	Pwp	Pw	Pw
MEBp	Meleb	Vw	Vw	Vw	Pw	Pw
MLI	McKinley	Pw	Pw	Pw	Pw	Pw
MLIp	McKinley	Vsw	Vsw	Vsw	Vsw	Pw
MNT	Malonton	Psw	Pw	Pw	Psw	Pw
MNT /xx1x	Malonton	Psw	Pw	Pw	Psw	Pw
MNT /xx2x	Malonton	Psw	Pw	Pw	Psw	Pw
MNT /xx3x	Malonton	Psw	Pw	Pw	Psw	Pw
MNT /xx4x	Malonton	Psw	Ppw	Ppw	Ppw	Pw
MNTd	Malonton	Ps	Fs	Fsw	Ps	Fw
MNTd/xx1x	Malonton	Ps	Fs	Fsw	Ps	Pw
MNTd/xx2x	Malonton	Ps	Fs	Fsw	Ps	Pw
MNTp	Malonton	Vsw	Vsw	Vsw	Vsw	Pw
MNTp/xx1x	Malonton	Vsw	Vsw	Vsw	Vsw	Pw
MNTp/xx2x	Malonton	Vsw	Vsw	Vsw	Vsw	Pw
MNTp/xx4x	Malonton	Vsw	Vsw	Vsw	Vsw	Pw
MNTp	Malonton	Vsw	Vsw	Vsw	Vsw	Pw
MRS	Morris	Ps	Ps	Ps	Ps	Pa
MRQ	Marquette	Ps	Psw	Psw	Ps	Pa
MRQ /xx2x	Marquette	Ps	Psw	Psw	Ps	Pa
NIV	Niverville	Fsw	Fsw	Fsw	Fsw	Faw
NUS	Nourse	Fw	Fw	Fw	Fw	Faw
OBO	Osborne	Psw	Psw	Psw	Psw	Paw
OBOp	Osborne	Vws	Vws	Vws	Vws	Va
OVO	Overflowing	Vsw	Vsw	Vsw	Vsw	Vaw
PAN	Pansy	Vs	Vs	Vs	Vs	Fw
PAN /xx1x	Pansy	Vs	Vs	Vs	Vs	Fw
PAN /xx2x	Pansy	Vs	Vs	Vs	Vs	Fw
PGE	Partridge Creek	Pws	Pws	Pws	Pws	Pws
PGE /xx1x	Partridge Creek	Pws	Pws	Pws	Pws	Pws
PGU	Peguis	Psw	Pws	Pws	Ps	Pa
PGU /xx1x	Peguis	Psw	Pws	Pws	Ps	Pa
PIY	Piney	Fw	Fw	Fw	Fw	Paw

TABLE 8. SUITABILITY RATINGS OF SOILS FOR RECREATIONAL USES

Map Symbol and Phase	Soil Name	Play Ground [11]	Picnic Area [12]	Camp Area [13]	Path And Trails [14]	Permanent Bldgs. Without Basements [4]
PLN	Pelan	Fsw	Fsw	Fsw	Fw	Fw
PLN /xx1x	Pelan	Fsw	Fsw	Fsw	Fw	Fw
PLN /xx2x	Pelan	Fsw	Fsw	Fsw	Fw	Fw
PLN /xx3x	Pelan	Pp	Fsw	Pp	Fwp	Pw
PLN /xx4x	Pelan	Pp	Pp	Pp	Pp	Pw
PMU	Pineimuta	Pw	Pw	Pw	Pw	Pw
PPL	Poppleton	Fsw	Fsw	Fsw	Fw	Pw
PPL /xx1x	Poppleton	Fs	Fs	Fsw	Fw	Pw
PPL /xx2x	Poppleton	Fps	Fs	Fsw	Fw	Pw
PPL /xx3x	Poppleton	Pp	Fps	Pp	Fpw	Pw
PRA	Prawda	Psw	Pw	Pw	Psw	Pw
PRAp	Prawda	Vsw	Vsw	Vsw	Vsw	Pw
PRG	Pine Ridge	Vs	Vs	Vs	Vs	G
PRG /xcxx	Pine Ridge	Vs	Vs	Vs	Vs	G
PRG /xx1x	Pine Ridge	Vs	Vs	Vs	Vs	G
PRG /xx2x	Pine Ridge	Vs	Vs	Vs	Vs	G
PRG /xx4x	Pine Ridge	Vs	Vs	Vs	Vs	Fp
RIV	Red River	Ps	Pws	Pws	Ps	Pa
RRV	Reed River	Vsw	Vsw	Vsw	Vsw	Vaw
RTV	Rat River	Vsw	Vsw	Vsw	Vsw	Vaw
SCY	Scanterbury	Ps	Pws	Pws	Ps	Pa
SDI	Sandiland	Vs	Vs	Vs	Vs	G
SDI /xcxx	Sandiland	Vs	Vs	Vs	Vs	G
SDI /xdxx	Sandiland	Vs	Vs	Vs	Vs	G
SDI /xd3x	Sandiland	Vs	Fp	Vs	Vs	Fp
SDI /xx1x	Sandiland	Vs	Vs	Vs	Vs	G
SIK	Sirko	Pqw	Fsw	Fsw	Fw	Fw
SIK /xx1x	Sirko	Pqw	Fsw	Fsw	Fw	Fw
SLB	St. Labre	Ps	Fs	Fs	G	G
SLB /xx2x	St. Labre	Ps	Fs	Fsp	G	G
SLB /xx3x	St. Labre	Psp	Fsp	Pp	Fp	Fa
SLB /xx4x	St. Labre	Psp	Pp	Pp	Pp	Fap
SPG	Sprague	Psw	Pw	Pw	Pw	Pw
SPG /xx1x	Sprague	Psw	Pw	Pw	Pw	Pw
SPG /xx2x	Sprague	Psw	Pw	Pw	Pw	Pw
SPG /xx3x	Sprague	Psw	Pw	Ppw	Pw	Pw
SPGp/xx3x	Sprague	Vw	Vw	Vw	Pw	Pw
SPG /xx4x	Sprague	Psw	Ppw	Ppw	Ppw	Pw
SPGp	Sprague	Vw	Vw	Vw	Pw	Pw
SRE	Seine River	Fws	Fws	Fws	Fws	Fw

TABLE 8. SUITABILITY RATINGS OF SOILS FOR RECREATIONAL USES

Map Symbol and Phase	Soil Name	Play Ground [11]	Picnic Area [12]	Camp Area [13]	Path And Trails [14]	Permanent Bldgs. Without Basements [4]
SRL	Spearhill	Pqw	Fsw	Fsw	Fw	Fw
SRL /xx1x	Spearhill	Pqw	Fsw	Fsw	Fw	Fw
STD	Stead	Vsw	Vsw	Vsw	Vsw	Vaw
SUJ	South Junction	Vsw	Vsw	Vsw	Vsw	Vaw
SUW	Sundown	Pqw	Pw	Pw	Pw	Pw
SUW /xx1x	Sundown	Pqw	Pw	Pw	Pw	Pw
SUW /xx2x	Sundown	Pqw	Pw	Pw	Pw	Pw
SUWp/xx2x	Sundown	Pqw	Vsw	Vsw	Vsw	Pw
SUWp/xx5x	Sundown	Ppw	Vpw	Vpw	Vpw	Ppw
SUWp	Sundown	Pqw	Vsw	Vsw	Vsw	Pw
THG	Thalberg	Psw	Pws	Pws	Ps	Pa
VIT	Vita	Pqw	Pw	Fw	Fw	Fw
VIT /xx2x	Vita	Pqw	Pw	Fw	Fw	Fw
VIT /xx3x	Vita	Pqw	Pw	Fpw	Fpw	Fs
VLW	Venlaw	Pmc	Pm	G	G	G
VLW /xx2x	Venlaw	Psc	Pm	Fp	G	G
WDN	Weiden	Pw	Pw	Pw	Pw	Pw
WDN /xx1x	Weiden	Pw	Pw	Pw	Pw	Pw
WDN /xx2x	Weiden	Pw	Pw	Pw	Pw	Pw
WGE	Wintergreen	Vs	Vs	Vs	Vs	Fw
WGE /xx2x	Wintergreen	Vs	Vs	Vs	Vs	Fw
WGE /xx3x	Wintergreen	Vs	Vs	Vs	Vs	Fpw
WGE /xx4x	Wintergreen	Vs	Vs	Vs	Vs	Fpw
WOG /xc3x	Woodridge	Pmp	Pm	Pp	Fp	Fp
WOG	Woodridge	Pmc	Pm	G	G	G
WOG /xx1x	Woodridge	Pmc	Pm	G	G	G
WOG /xx2x	Woodridge	Pmc	Pm	Fp	G	G
WOG /xx4x	Woodridge	Pmp	Pmp	Pp	Pp	Fp
WOM	Woodmore	Fw	Fw	Fw	Fw	Faw
WOM /xx1x	Woodmore	Fw	Fw	Fw	Fw	Faw
WOM /xx2x	Woodmore	Fwp	Fw	Fwp	Fw	Faw
ZHD	Zhoda	Ps	Pm	Fs	G	G

Appendix A

GLOSSARY

AASHO classification (soil engineering) - The official classification of soil materials and soil aggregate mixtures for highway construction used by the American Association of State Highway Officials.

Acid soil - A soil having a pH less than 7.0. See also Reaction, soil.

Acidity - (Alkalinity) - The degree of acidity of the soil expressed in pH values. See Reaction, soil.

Afforestation - The artifical establishment of forest crops by planting or sowing on land that has not previously, or recently, grown trees.

Alluvium - A general term for all deposits of rivers and streams.

Arable soil - Soil suitable for plowing and cultivation.

Association - A sequence of soils of about the same age, derived from similar parent material, and occuring under similar climatic conditions but showing different characteristics due to variations in relief and in drainage.

1/3 Atmosphere Moisture - The moisture percentage on dry weight basis of a soil sample that has been air dried, screened, saturated and subjected to a soil moisture tension of 345 cm of water through a permeable membrane for a period of 48 hours. It approximates the soil moisture retention capacity.

Available nutrient - That portion of any element or compound in the soil that can be readily absorbed and assimilated by growing plants.

Available soil moisture - The portion of water in a soil that can be readily absorbed by plant roots: generally considered to be that water held in the soil up to approximately 15 atmospheres pressure.

Basal Area - The area of the cross section (measured inside or outside the bark, usually the latter) of a single tree or all trees in a stand, expressed either in square feet or square meters.

Base saturation percentage - The extent to which the adsorption complex of a soil is saturated with exchangeable cations other than hydrogen and aluminum. It is expressed as a percentage of the total cation exchange capacity.

Bearing capacity - Capacity of soil (in moist to wet conditions) to support loads such as buildings, people, vehicles, and animals.

Bedrock - The solid rock that underlies soil and regolith or that is exposed at the surface.

Biomass - The total amount of living material in a particular habitat or area (in forestry pertaining to plant biomass or tree biomass).

Boulders - Stones which are larger than 60 cm in diameter.

Bulk density - The weight of oven dry soil (105 degrees C) divided by its volume at field moisture conditions, expressed in grams per cubic centimeter.

Buried soil - Soil covered by an alluvial, loessial, or other deposit, usually to a depth greater than the thickness of the solum.

Calcareous soil - Soil containing sufficient calcium carbonate (often with magnesium carbonate) to effervesce visibly when treated with hydrochloric acid.

Calcium Carbonate Equivalent - Refers to the percent of carbonates in the soil expressed on the basis of calcium carbonate. Terms used to express the carbonate contents of soils are:

noncalcareous	<1%
weakly calcareous	1-5%
moderately calcareous	6-15%
strongly calcareous	16-25%
v. strongly calcareous	26-40%
extremely calcareous	>40%

Capillary fringe - A zone of essentially saturated soil just above the water table. The size distribution of the pores determines the extent and degree of the capillary fringe.

Carbon-nitrogen ratio (C/N ratio) - The ratio of the weight of organic carbon to the weight of total nitrogen in a soil or in an organic material.

Cation Exchange Capacity (**CEC**) - A measure of the total amount of exchangeable cations that can be held by a soil. Expressed in milliequivalents per 100g of soil.

Clay - As a soil separate, the mineral soil particles less than 0.002 mm in diameter: usually consisting largely of clay minerals. As a soil textural class, soil materials that contain 40 or more percent clay, less than 45 percent sand and less than 40 percent silt. See Texture, soil.

Clayey - A soil particle size class used to describe soil materials with more than 35% clay by weight. See Particle size, soil.

Clear Cutting - A method of cutting that removes the entire timber stand on the area cut.

Cobbles - Rock fragments 8 to 25 cm in diameter.

Coarse texture - The texture exhibited by soils with high sand contents, such as sands, loamy sands, and sandy loams. See also Texture, soil.

Color - Soil colors are compared with a Munsell color chart. The Munsell system specifies the relative degrees of the three simple variables of color: hue, value and chroma. For example: 10YR 6/4 means a hue of 10YR, a value of 6, and a chroma of 4.

Complex (**soil**) - A mapping unit used in detailed and reconnaissance soil surveys where two or more soil series that are so intimately intermixed in an area that it is impractical to separate them at the scale of mapping used.

Concretions - Hard grains, pellets or nodules from concentration of compounds in the soil that cement soil grains together.

Conductivity electrical - A physical quantity that measures the readiness with which a medium transmits electricity. It is expressed as the reciprocal of the electric resistance (ohms) or millisiemens per cm at 25 degrees C of a conductor which is one cm long with a cross sectional area of one square cm. It is used to express the concentration of salt in irrigation water or soil extracts.

Conifer - A tree belonging to the order Coniferae with cones and evergreen leaves of needle shape or "scale like". The tree is harvested to produce wood known commercially as "softwood".

Consistence (soil) - The mutual attraction of the particles in a soil mass, or their resistance to separation or deformation. It is described in terms such as loose, soft, friable, firm, hard, sticky, plastic or cemented.

Consumptive use factor (CU) - The ratio of consumptive use of water by a crop to potential evapotranspiration. An actively growing crop that completely covers the soil over a large area and that has an ample supply of readily available soil water has a consumptive use factor of 1.0.

Consumptive use of water - The sum of the amount of water transpired by the plants and evaporated from the soil surface and from intercepted precipitation. It may be less or greater than potential evapotranspiration.

Contour - An imaginary line connecting points of equal elevation on the surface of the soil.

Control section, soil - The vertical section upon which the taxonomic classification of soil is based. The control section usually extends to a depth of 100 cm in mineral materials and 160 cm in organic materials.

Cover - This term generally has one of the following meanings:

1. Vegetation or other material providing protection
2. In forestry, low growing shrubs and herbaceous plants under trees (i.e., ground cover vs. tree cover)
3. Any vegetation producing a protective mat on or just above the soil surface.

Cover Type - A descriptive term used to group together softwood (coniferous), hardwood (deciduous), or mixed wood (a mixture of softwoods and hardwoods) stands.

Creep (soil) - Slow mass movement of soil and soil material down rather steep slopes primarily under the influence of gravity, but aided by saturation with water and by alternate freezing and thawing.

Crown - The upper part of a tree, including the branches and foliage.

Crown Class - All trees in a stand with tops or crowns occupying a similar position in the canopy or crown cover. Crown classes usually distinguished are:

dominant: Trees with crowns

extending above the general level of the forest canopy and receiving full light from above and partly from the side; larger than the average trees in the stand and with crowns well developed but possibly somewhat crowded on the sides.

co-dominant: Trees with crowns forming the general upper level of the forest canopy with the dominants receiving full light from above, but comparatively little from the sides; usually with small crowns and stem diameter; considerably crowded on the sides.

intermediate: Trees with crowns below but still extending into the general level of the forest canopy, receiving a little direct light from above but none from the sides; usually with small crowns and stem diameter; considerably crowded on the sides.

Crown Cover - The canopy formed by the crown of all the trees in a forest.

Cut-over Forest - A forest in which most or all of the merchantable timber has been cut.

Deciduous Tree - A tree that sheds all its leaves every year at a certain season.

Decile portion - A one-tenth portion. As used in the soil map symbol A7 B3 means that the A soils cover seven tenths and the B soils cover three tenths of the map unit.

Delta - A fluvial or glaciofluvial fan shaped deposit at the mouth of a river that empties into a lake or sea.

Deflocculate - To separate or to break up soil aggregates into individual particles by chemical or physical means or both.

Diameter Breast Height (DBH) - The diameter of a tree 1.35 m above ground level.

Dispersion - Is rated high, moderate or low depending on how readily the soil structure breaks down or slakes because of excess moisture. A rating of high indicates that soil aggregates slake readily; a rating of low indicates that aggregates are resistant to dispersion and remain clumped together.

Drainage (soil) - (1) The rapidity and extent of the removal of water from the soil by runoff and flow through the soil to underground spaces. (2) As a condition of the soil, it refers to the frequency and duration of periods when the soil is free of saturation.

Drainage in soil reports is described on the basis of actual moisture content in excess of field capacity and length of the saturation period within the plant root zone. The terms are as follows:

Very rapidly drained - Water is removed from the soil very rapidly in relation to supply. Excess water flows downward very rapidly if underlying material is pervious. There may be very rapid subsurface flow during heavy rainfall provided there is a steep gradient. Soils have very low available water storage capacity (usually less than 2.5 cm) within the control section and are usually coarse in texture, or shallow, or both. Water source is precipitation.

Rapidly drained - Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep gradients during heavy rainfall. Soils have low available water storage capacity (2.5-4 cm) within the control section, and are usually coarse in texture, or shallow, or both. Water source is precipitation.

Well drained - Water is removed from the soil readily but not rapidly. Excess water flows downward readily into underlying pervious material or laterally as subsurface flow. Soils have intermediate available water storage capacity (4-5 cm) within the control section, and are generally intermediate in texture and depth. Water source is precipitation. On slopes subsurface flow may occur for short durations but additions are equaled by losses. These soils are usually free of mottles within 100 cm of the surface but may be mottled below this depth. Soil horizons are usually bright colored.

Moderately well drained - Water is removed from the soil somewhat slowly in relation to supply. Excess water is removed somewhat slowly due to low perviousness, shallow water table, lack of gradient, or some combination of these. Soils have intermediate to high water storage capacity (5-6 cm) within the control section and are usually medium to fine in texture. Soils are commonly mottled in the 50 to 100 cm depth. Colors are dull brown in the subsoil with stains and mottles.

Imperfectly drained - Water is removed from the soil sufficiently slowly in relation to supply to keep the soil wet for a significant part of the growing season. Excess water moves slowly downward if precipitation is major supply. If subsurface water or groundwater, or both, is the main source, flow rate may vary but the soil remains wet for a significant part of the growing season. Precipitation is the main source if available water storage capacity is high; contribution by subsurface flow or groundwater flow, or both, increases as available water storage capacity decreases. Soils have a wide range in available water supply, texture, and depth, and are gleyed phases of well drained subgroups. These soils generally have mottling below the surface layers and generally have duller colors with depth, generally brownish gray with mottles of yellow and gray.

Poorly drained - Water is removed so slowly in relation to supply that the soil remains wet for a comparatively large part of the time when the soil is not frozen. Excess water is evident in the soil for a large part of the time. Subsurface flow or groundwater flow, or both, in addition to precipitation are main water sources; there may also be a perched water table, with precipitation exceeding evapotranspiration. Poorly drained soils have a wide range in available water storage capacity, texture, and depth, and are gleyed subgroups, Gleysols, and Organic soils.

Very poorly drained - Water is removed from the soil so slowly that the water table remains at or on the surface for the greater part of the time the soil is not frozen. Excess water is present in the soil for the greater part of the time. Groundwater flow and subsurface flow are major water sources. Precipitation is less important except where there is a perched water table with precipitation exceeding evapotranspiration. These soils have a wide range in available water storage capacity, Texture, and depth, and are either Gleysolic or Organic.

Drumlin - See Appendix C.

Dryland farming - The practice of crop production in low rainfall areas without irrigation.

Eluvial horizon - A horizon from which material has been removed in solution or in water suspension.

End moraine - See Appendix C.

Eolian - Soil material accumulated through wind action.

Ericaceous - Shrubby perennial plants of the Ericaceae (Heath) family. Includes such plants as leather leaf (Chamaedaphne calyculata), bearberry (Arctostaphylos uva-ursi), wild rosemary (Andromeda glaucophylla), sheep-laurel (Kalmia polifolia), and Labrador tea (Ledum spp.).

Erosion - The wearing away of the land surface by detachment and transport of soil and rock material through the action of moving water, wind or other geological processes.

Evapotranspiration - The combined loss of water from a given area, and during a specific period of time, by evaporation from the soil surface and transpiration from plants.

Even-aged - A stand of trees in which only small differences in age occur between the individuals.

Exchange capacity - See cation exchange capacity.

Family, soil - A category in the Canadian system of soil classification. A soil family is a subdivision of a subgroup, carrying the additional differentiating properties of parent material characteristics, soil climatic factors, and soil reaction.

Farm Forestry - The practice of forestry on farm or ranch land, generally integrated with other farm or ranch operations.

Field Moisture Equivalent - The minimum moisture content at which a drop of water placed on a smoothed surface of the soil will not be absorbed immediately by the soil, but will spread out over the surface and give it a shiny appearance.

Fine texture - The texture exhibited by soils with a high content of fine particles such as silts and clays. This includes the textural classes of clay loam, sandy clay loam, silty clay loam, silty clay, and clay. See also Texture, soil.

Flood plain - The land bordering a stream, built up of sediments from overflow of the stream and subject to innundation when the stream is at flood stage.

Fluvial deposits - All sediments past and present, deposited by flowing water, including glaciofluvial deposits.

Forest - A plant association predominantly of trees and other woody vegetation.

Frost heave - The raising of the surface caused by ice in the subsoil.

Friable - Soil aggregates that are soft and easily crushed between thumb and forefinger.

Glaciofluvial deposits - Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. These deposits are stratified and may occur in the form of outwash plains, deltas, kames, eskers and kame terraces.

Gleyed soil - An imperfectly or poorly drained soil in which the material has been modified by reduction or alternating reduction and oxidation. These soils have lower chromas or more prominent mottling or both in some horizons than the associated well-drained soil.

Gleysolic - An order of soils developed under wet conditions and permanent or periodic reduction. These soils have low chromas or prominent mottling or both, in some horizons.

Granular Structure - See Structure, soil.

Gravel - Rock fragments 2 mm to 7.5 cm in diameter.

Great group, soil - A category in the Canadian system of soil classification. These are subdivisions of each order, based on the strengths of the dominant processes in soil formation. Twenty eight soil great groups are currently recognized.

Gross Mean Annual Increment (GMAI) - Total growth of trees in a stand up to a given age, divided by that age.

Gross Merchantable Volume - Total volume of wood being removed from the forest (unculled).

Ground moraine - An unsorted mixture of rocks, boulders, sand, silt and clay deposited by glacial ice. The predominant material is till; most till is thought to have accumulated under the ice by lodgment, but some till has been let down from the upper surface of the ice by ablation. Resorting and modification may have taken place to some extent by wave-action of glacial melt waters. The topography is most commonly in the form of undulating plains with gently sloping hills and enclosed depressions.

Groundwater - Water beneath the soil surface, usually under conditions where the voids are completely filled with water (saturation).

Halophytic vegetation - vegetation that grows naturally in soils having a high content of various salts. It usually has fleshy leaves or thorns and resembles desert vegetation.

Hardwoods - A term applied to one of the botanical groups of trees that have broad leaves; also wood produced by trees of this group regardless of texture.

Horizon (soil) - A layer in the soil profile approximately parallel to the land surface with more or less well-defined characteristics that have been produced through the operation of soil forming processes. See Appendix B.

Horizon boundary - The lower boundary of each horizon is described by indicating its distinctness and form. The distinctness depends on the abruptness of vertical change (thickness). The form refers to the variation of the boundary plane.

Distinctness -
abrupt - less than 2 cm
clear - 2 to 5 cm
gradual - 5 to 15 cm
diffuse - more than 15 cm

Form -
smooth - nearly plain
wavy - pockets are wider than deep
irregular - pockets are deeper than wide
broken - parts of the horizon are unconnected with other parts

Humic layer - A layer of highly decomposed organic soil material containing little fibre.

Hydraulic conductivity - Refers to the effective flow velocity or discharge velocity in soil at unit hydraulic gradient. It is an approximation of the permeability of the soil and is expressed in cm per hour.

Hydrologic cycle - The conditions through which water naturally passes from the time of precipitation until it is returned to the atmosphere by evaporation and is again ready to be precipitated.

Hydrophyte - Plants growing in water or dependent upon wet or saturated soil conditions for growth.

Illuvial horizon - A soil horizon in which material carried from an overlying layer has been precipitated from solution or deposited from suspension. The layer of accumulation.

Impeded drainage - A condition that hinders the movement of water by gravity through the soils.

Inclusion - Soil type found within a mapping unit that is not extensive enough to be mapped separately or as part of a complex.

Increment - The increase in diameter basal area, height, volume, quality, or value of a tree or stand during a given period.

Indicator plant - Any plant that by its presence, its frequency or its vigor indicates any particular property of the site-particularly but not exclusively of the soil.

Infiltration - The downward entry of water into the soil

Irrigation - The artificial application of water to the soil for the benefit of growing crops.

Irrigation requirement (IR) - Refers to the amount of water exclusive of effective precipitation that is required for crop production.

Lacustrine deposits - Material deposited by or settled out of lake waters and exposed by lowering of the water levels or elevation of the land. These sediments range in texture from sand to clay and are usually varved (layered annual deposits).

Landforms - See Appendix C.

Landscape - All the natural features such as fields, hills, forest, water, etc., which distinguish one part of the earth's surface from another part.

Leaching - The removal from the soil of materials in solution.

Limiting Factor - A factor whose absence, or excessive concentration, exerts some restraining influence upon a population through incompatibility with species requirements or tolerance.

Liquid limit (upper plastic limit) - The water content corresponding to an arbitrary limit between the liquid and plastic states of consistency of a soil. The water content at this boundary is defined as that at which a pat of soil cut by a groove of standard dimensions will flow together for a distance of 1.25 cm under the impact of 25 blows in a standard liquid limit apparatus.

Lineal shrinkage - This is the decrease in one dimension expressed as a percentage of the original dimension of the soil mass when the moisture content is reduced from a stipulated percentage (usually field moisture equivalent) to the shrinkage limit.

Litter - A surface layer of loose organic debris in forests, consisting of freshly fallen or slightly decomposed organic materials.

Loam - A soil textural class. See also Texture, soil.

Loamy - A soil particle size class containing more than 15% fine sand or coarser particles by weight and less than 35% clay. See also Particle size, soil.

Mapping Unit - Any delineated area shown on a soil map that is identified by a symbol. A mapping unit may be a soil unit, a miscellaneous land type, or a soil complex.

Marsh - Periodically flooded or continually wet areas having the surface not deeply submerged. It is covered dominantly with sedges, cattails, rushes or other hydrophytic plants.

Maturity - The approximate age beyond which growth falls off or the rate of decay increases.

Medium texture - Intermediate between fine textured and coarse textured soils. It includes the very fine sandy loam, loam, silt loam, and silt soil texture classes. See also Texture, soil.

Merchantable Volume (Net) - Volume of wood of a size and quality suitable for marketing and utilization.

Mesophyte - Plants requiring intermediate moisture conditions and are not very resistant to drought.

Microrelief - Small-scale, local differences in relief including mounds, swales or hollows.

Milliequivalent (me) - One-thousandth of an equivalent. An equivalent is the weight in grams of an ion or compound that combines with or replaces one gram of hydrogen. The atomic or formula weight divided by valence.

Mineral soil - A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter. It contains less than 17% organic carbon (30% organic matter) by weight, except for a mesic or humic organic layer up to 40 cm thick or predominantly fibric organic material up to 60 cm thick.

Mixed Forest - A forest composed of two or more species of trees. In practice, usually a forest in which at least 20% are trees of other than dominant species. Frequently applied to forests consisting of a combination of hardwood softwood species.

Modified Clear Cutting - A clear cutting system in which the size and shape of the cut areas are varied to provide a source of seed for the cut areas from timber margins.

Moisture Regime - Annual moisture status of the unconsolidated soil material, expressing the moisture available to trees in descriptive terms. The broad classes used by foresters are given below with the approximate equivalent terms used by soil surveyors.

Dry	periodic to prolonged lack of soil moisture (excessively drained).
Fresh	adequate soil moisture supply, without prolonged lack or excess of soil moisture (well drained).
Moist	periodic excess of soil moisture (imperfectly drained).
Wet	prolonged to permanent excess to soil moisture (poorly drained).
Saturated	permanent excess of soil moisture at the surface (very poorly drained).

Mottles - Irregularly marked spots or streaks, usually yellow or orange but sometimes blue. They are described in order of abundance (few, common, many), size (fine, medium, coarse) and contrast (faint, distinct, prominent). Mottles in soils indicate poor aeration and lack of good drainage.

Order, soil - The highest division or category in the Canadian system of soil classification. Soils are categorized at the order level based on properties that reflect the soil environment and its effects on the dominant soil-forming processes. All the soils of Canada have been divided into nine orders; Brunisolic, Chernozemic, Crysolic, Gleysolic, Luvisolic, Organic, Podzolic, and Solonetzic.

Outwash - Sediments "washed out" beyond the glacier by flowing water and laid down in thin beds or strata. Particle size may range from boulders to silt.

Ovendry soil - Soil that has been dried at 105 degrees C until it has reached constant weight.

Overstory - The portion of the trees in a forest stand forming the upper crown cover.

Parent material - The unaltered or essentially unaltered mineral or organic material from which the soil profile develops by pedogenic processes.

Partial Cutting - A system of cutting in which only a portion of the stand is removed during the first cut. The remainder of the stand is used as a seed source and to provide shade for seedlings, and is ordinarily removed following the successful establishment of reproduction.

Particle size, soil - The grain size distribution of the whole soil including the coarse fraction. It differs from texture, which refers to the fine earth (less than 2 mm) fraction only. In addition, textural classes are usually assigned to specific horizons whereas soil family particle-size classes indicate a composite particle size of a part of the control section that may include several horizons.

The particle-size classes for family groupings are as follows:

Fragmental Stones, cobbles and gravel, with too little fine earth to fill interstices larger than 1 mm.

Sandy-skeletal Particles coarser than 2 mm occupy 35% or more by volume with enough fine earth to fill interstices larger than 1 mm; the fraction finer than 2 mm is that defined for the sandy particle-size class.

Loamy-skeletal Particles 2 mm-25 cm occupy 35% or more by volume with enough fine earth to fill interstices larger than 1 mm; the fraction finer than 2 mm is that defined for the loamy particle-size class.

Clayey-skeletal Particles 2 mm-25 cm occupy 35% or more by volume with enough fine earth to fill interstices larger than 1 mm; the fraction finer than 2 mm is that defined for the clayey particle-size class.

Sandy The texture of the fine earth includes sands and loamy sands, exclusive of loamy very fine sand and very fine sand textures; particles 2 mm- 25 cm occupy less than 35% by volume.

Loamy The texture of the fine earth includes loamy very fine sand, very fine sand, and finer textures with less than 35% clay; particles 2 mm-25 cm occupy less than 35% by volume.

Coarse-loamy. A loamy particle size that has 15% or more by weight of fine sand (0.25-0.1 mm) or coarser particles, including fragments up to 7.5 cm, and has less than 18% clay in the fine earth fraction.

Fine-loamy. A loamy particle size that has 15% or more by weight of fine sand (0.25-0.1 mm) or coarser particles, including fragments up to 7.5 cm, and has 18-35% clay in the fine earth fraction.

Coarse-silty. A loamy particle size that has less than 15% of fine sand (0.25-0.1 mm) or coarser particles, including fragments up to 7.5 cm, and has less than 18% clay in the fine earth fraction.

Fine-silty. A loamy particle size that has less than 15% of fine sand (0.25-0.1 mm) or coarser particles, including fragments up to 7.5 cm, and has 18-35% clay in the fine earth fraction.

Clayey. The fine earth contains 35% or more clay by weight and particles 2mm-25 cm occupy less than 35% by volume.

Fine-clayey. A clayey particle size that has 35-60% clay in the fine earth fraction.

Very-fine-clayey. A clayey particle size that has 60% or more clay in the fine earth fraction.

Ped - An individual soil aggregate such as granule, prism or block formed by natural processes (in contrast with a clod which is formed artificially).

Pedon - The smallest three dimensional body at the earth's surface that is considered as a soil; the basic unit of soil to be described, sampled, analyzed, and classified. A pedon represents the cyclical variation in soil properties of a soil series in the landscape, with lateral dimensions of 1 to 3.5 m and depth of 1 to 2 m.

Pedology - Those aspects of soil science involving constitution, distribution, genesis and classification of soils.

Percolation - The downward movement of water through soil. specifically, the downward flow of water in saturated or nearly saturated soil at hydraulic gradients of 1.0 or less.

Permafrost -

1. Perennially frozen material underlying the solum.
2. A perennially frozen soil horizon.

Permafrost table - The upper boundary of permafrost, usually coincident with the lower limit of seasonal thaw (active layer).

Permeability - The ease with which water and air pass through the soil to all parts of the profile. It is described as rapid, moderate or slow.

pH - The intensity of acidity and alkalinity, expressed as the logarithm of the reciprocal of the H+ ion concentration. pH 7 is neutral, lower values indicate acidity and higher values alkalinity.

Phase, soil - A soil phase is a unit of soil outside the system of soil taxonomy. It is a functional unit and is used at any categorical level from Order to Series. It is used to characterize soil and landscape properties that are not used as criteria in soil taxonomy. The major phase differentiae are: slope, erosion, deposition, stoniness, texture, salinity, and calcareousness.

Plastic Limit - The water content corresponding to an arbitrary limit between the plastic and the semisolid states of consistency of a soil.

Plasticity Index - The numerical difference between the liquid and the plastic limit. The plasticity index gives the range of moisture contents within which a soil exhibits plastic properties.

Potential evapotranspiration (PE) - The maximum quantity of water capable of being lost as water vapor, in a given climate, by a continuous stretch of vegetation covering the whole ground and well supplied with water.

Profile, soil - A vertical section of the soil through all its horizons and extending into the parent material.

Pure Forest - A forest composed essentially of trees of one species. In practice, a forest in which at least 80% of the trees are of one species.

Reaction, soil - The acidity or alkalinity of a soil. Soil reaction classes are characterized as follows:

extremely acid	pH < 4.5
very strongly acid	4.5 to 5.0
strongly acid	5.1 to 5.5
medium acid	5.6 to 6.0
slightly acid	6.1 to 6.5
neutral	6.6 to 7.3
mildly alkaline	7.4 to 7.8
mod. alkaline	7.9 to 8.4
strongly alkaline	8.5 to 9.0
very strongly alkaline	> 9.0

Reforestation - Restocking an area with forest trees.

Regolith - The unconsolidated mantle of weathered rock and soil material on the earth's surface.

Relief - The elevation of inequalities of the land surface when considered collectively.

Rotation age - The age at which trees have grown to a specific maturity and are harvested.

Runoff - The portion of the total precipitation on an area that flows away through stream channels. Surface runoff does not enter the soil. Groundwater runoff or seepage flow from groundwater enters the soil before reaching the stream.

Saline Soil - A nonalkali soil containing soluble salts in such quantities that they interfere with the growth of most crop plants. The conductivity of the saturation extract is greater than 4 millisiemens/cm (mS/cm), the exchangeable-sodium percentage is less than 15, and the pH is usually less than 8.5. Approximate limits of salinity classes are:

non-saline	0 to 4 mS/cm
slightly saline	5 to 8 mS/cm
mod. saline	9 to 15 mS/cm
strongly saline	> 15 mS/cm

Salinization - The process of accumulation of salts in the soil.

Salt-Affected Soil - Soil that has been adversely modified for the growth of most crop plants by the presence of certain types of exchangeable ions or of soluble salts. It includes soils having an excess of salts, or an excess of exchangeable sodium or both.

Sand - A soil particle between 0.05 and 2.0 mm in diameter. The textural class name for any soil containing 85 percent or more of sand and not more than 10 percent of clay.

Saturation Percentage - The moisture percentage of a saturated soil paste, expressed on an oven dry weight basis.

Seepage -

1. The escape of water downward through the soil.
2. The emergence of water from the soil along an extensive line of surface in contrast to a spring where water emerges from a local spot.

Series, soil - A category in the Canadian system of soil classification. It consists of soils that have soil horizons similar in their differentiating characteristics and arrangement in the profile, and are formed from a particular type of parent material.

Shelterbelt - See Windbreak

Shrinkage limit - This is the moisture content at which an equilibrium condition of volume change is reached and further reduction in moisture content will not cause a decrease in the volume of the soil mass.

Shrinkage ratio - This is the ratio between the volume change and a corresponding change in moisture content. It equals the apparent specific gravity of the dried soil.

Silt - (a) Individual mineral particles of soil that range in diameter between 0.05 to .002 mm. (b) Soil of the textural class silt contains greater than 80 percent silt and less than 12 percent clay.

Site - An area of land characterized by regional and local climate, soil material, relief, soil moisture and nutrients which influence the development of the biotic communities on that land.

Site Index - A numerical expression commonly accepted as an indicator of the quality or timber productivity of a site. It is an expression of the height-age relationship of the tallest trees (dominants and co-dominants) in normal stands at some designated age (usually rotation age).

Slickenside - Smoothed surfaces along planes of weakness resulting from the movement of one mass of soil against another in soils dominated by swelling clays.

Sodium-Adsorption Ratio (S.A.R.) - A ratio for soil extracts and irrigation waters used to express the relative activity of sodium ions in exhange reactions with soil. The ionic concentrations are expressed as milliequivalents per litre.

Soil - The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. Soil has been subjected to and influenced by genetic and environmental factors of: parent material, climate (including moisture and temperature effects), macro- and micro-organisms, and topography, all acting over a period of time.

Solum - The upper horizons of a soil above the parent material and in which the processes of soil formation are active. It usually comprises the A and B horizons.

Stand - An aggregation of trees or other growth occupying a specific area and sufficiently uniform in composition (species), age arrangement, and condition to be distinguishable from the forest or other growth on adjoining areas.

Stones - Rock fragments greater than 25 cm in diameter.

Stoniness - The relative proportion of stones in or on the soil. The classes of stoniness are defined as follows:

Stones 0. Nonstony -- Land having less than 0.01% of surface occupied by stones.

Stones 1. Slightly stony -- Land having 0.01-0.1% of surface occupied by stones. Stones 15-30 cm in diameter, 10-30 m apart. The stones offer only slight to no hindrance to cultivation.

Stones 2. Moderately stony -- Land having 0.1-3% of surface occupied by stones. Stones 15-30 cm in diameter, 2-10 m apart. Stones cause some interference with cultivation.

Stones 3. Very stony -- Land having 3-15% of surface occupied by stones. Stones 15-30 cm in diameter, 1-2 m apart. There are sufficient stones to constitute a serious handicap to cultivation.

Stones 4. Exceedingly stony -- Land having 15-50% of surface occupied by stones. Stones 15-30 cm in diameter, 0.7-1.5 m apart. There are sufficient stones to prevent cultivation until considerable clearing has been done.

Stones 5. Excessively stony -- Land having more than 50% of surface occupied by stones. Stones 15-30 cm in diameter, less than 0.7 m apart. The land is too stony to permit cultivation.

Storage Capacity - Refers to the maximum amount of readily available water that can be stored within the rooting zone of a crop in a given soil. For practical irrigation purposes, 50 percent of the total soil water between field capacity and wilting point may be considered as readily available.

Stratified materials - Unconsolidated sand, silt and clay arranged in strata or layers. In stratified materials, a bed is a unit layer distinctly separable from other layers and is one or more cm thick but a lamina is a similar layer less than 1 cm thick.

Structure - The combination or arrangement of primary soil particles into secondary soil particles, units or peds, which are separated from adjoining aggregates by surfaces of weakness. Aggregates differ in grade (distinctness) of development. Grade is described as structureless (no observable aggregation or no definite orderly arrangement; amorphous if coherent, single-grained if noncoherent), weak, moderate, and strong. The aggregates vary in class (size) and are described as fine, medium, coarse, and very coarse. The size classes vary according to the type (shape) of structure. The types of structure are:

Granular - Having more or less rounded aggregates without smooth faces and edges.

Platy - Having thin, plate-like aggregates with faces mostly horizontal.

Blocky - Having block-like aggregates with sharp, angular corners.

Subangular blocky - Having block-like aggregates with rounded and flattened faces and rounded corners.

By convention an aggregate is described in the order of grade, class and type, e.g. strong, medium, blocky and moderate, coarse, granular. In the parent material of soils the material with structural shapes may be designated as pseudo-blocky, pseudo-platy, etc.

Soil Survey - The systematic examination, description, classification, and mapping of soil in an area.

Subgroup - A category in the Canadian system of soil classification. A subgroup is a subdivision of a great group, differentiated on the basis of the kind and arrangement of soil horizons.

Sucker - Shoots that arise from the lower portion of a stump, especially from the root, following cutting of the original stem.

Sulfate Hazard - Refers to the relative degree of attack on concrete by soil and water containing various amounts of sulfate ions. It is estimated from electrolyte measurements and salt analysis on selected profiles and soil samples, and by visual examination of free gypsum within the profile during the course of soil investigation.

Swamp - See Appendix C.

Texture, soil - The relative proportions of the fine earth (less than 2 mm.) fraction of a soil. Textural classes are usually assigned to specific horizons whereas family particle size classes indicate a composite particle size of a portion of the control section that may include several horizons.

The size range of the constituent primary particles are as follows:

	Diameter (mm)
Very coarse sand	2.0-1.0
Coarse sand.	1.0-0.5
Medium sand.	0.5-0.25
Fine sand.	0.25-0.10
Very fine sand	0.10-0.05
Silt	0.05-0.002
Clay	< 0.002
Fine clay.	< 0.0002

Till, glacial - Unstratified glacial deposits consisting of clay, sand, gravel, and boulders intermingled in any proportion.

Tilth - The physical condition of soil as related to its ease of tillage, fitness as a seedbed, and its impedance to seedling emergence and root penetration.

Topography - Refers to the percent slope and the pattern or frequency of slopes in different directions. A set of 10 slope classes are used to denote the dominant but not necessarily most abundant slopes within a mapping unit.

Slope Class	Slope Name	Percent slope	Approx. degrees
1	level	0-0.5	0
2	nearly level	0.5-2.0	0.3-1.1
3	very gentle	2-5	1.1-3
4	gentle	5-9	3-5
5	moderate	9-15	5-8.5
6	strong	15-30	8.5-16.5
7	very strong	30-45	16.5-24
8	extreme	45-70	24-35
9	steep	70-100	35-45
10	very steep	>100	>45

Underground runoff (or seepage) - Water flowing towards stream channels after infiltration into the ground.

Unified Soil Classification System (engineering) - A classification system based on the identification of soils according to their particle size, gradation, plasticity index and liquid limit.

Understory - That portion of the trees in a forest below the upper crown cover.

Urban Land - Areas so altered or obstructed by urban works or structures that identification of soils is not feasible.

Variant, soil - A soil whose properties are believed to be sufficiently different from other known soils to justify a new series name, but comprising such a limited geographic area that creation of a new series is not justified.

Varve - A distinct band representing the annual deposit in sedimentary materials regardless of origin and usually consisting of two layers, one thick light colored layer of silt and fine sand laid down in the spring and summer, and the other a thin, dark colored layer of clay laid down in the fall and winter.

Water balance, soil - Is the daily amount of readily available water retained by the soil. The daily soil-water balance is decreased by the amount that the daily consumptive use exceeds the daily rainfall. When daily rainfall exceeds the consumptive use, the daily balance increases by the amount of the difference unless the soil-water balance is at storage capacity, in which case the excess is assumed to be lost by runoff or deep percolation.

Water table - (groundwater surface; free water surface; groundwater elevation). Elevation at which the pressure in the water is zero with respect to the atmospheric pressure.

Water-holding capacity - The ability of a soil to hold water. The water-holding capacity of sandy soils is usually considered to be low, while that of clayey soils is high. It is often expressed in cm of water per 30 cm depth of soil.

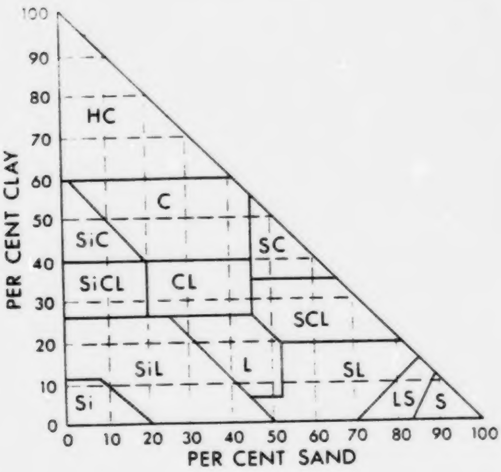
Weathering - The physical and chemical disintegration, alteration and decomposition of rocks and minerals at or near the earth's surface by atmospheric agents.

Windbreak -

1. A living barrier of trees or combination of trees and shrubs located adjacent to farm or ranch headquarters and designed to protect the area from cold or hot winds and drifting snow.
2. A narrow barrier of living trees or combination of trees and shrubs, usually from one to five rows, established within or around a field for the protection of land and crops from wind.

Woodlot - A relatively restricted area devoted to the growing of forest trees.

Xerophyte - Plants capable of surviving extended periods of soil drought.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PER CENT CLAY
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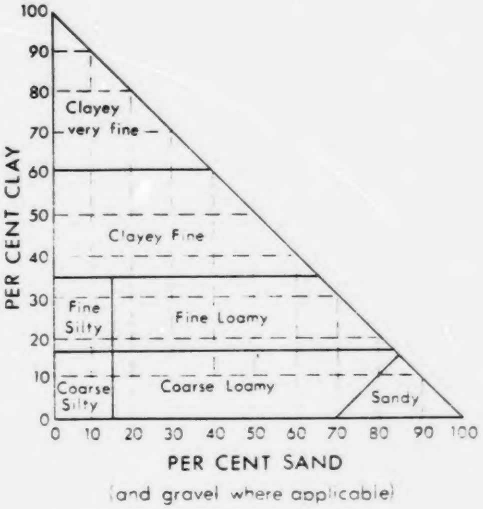
100
PER CENT SAND

Texture Group	Class Symbol	Class Name
Coarse	S	sand
	LS	loamy sand
Moderately coarse	SL	sandy loam
	LVFS	loamy very fine sand
Medium	Si	silt
	SiL	silt loam
	L	loam
	VFSL	very fine sandy loam
Moderately fine	SCL	sandy clay loam
	CL	clay loam
	SiCL	silty clay loam
Fine	SC	sandy clay
	C	clay
	SiC	silty clay
Very fine	HC	heavy clay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PER CENT CLAY
Clayey very fine
Clayey Fine
Fine Silty
Fine Loamy
Coarse Silty
Coarse Loamy
Sandy
0
10
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50
60
70
80
90
100
PER CENT SAND
(and gravel where applicable)

Figure 11: Family particle-size classes.

Figure 12: Soil Textural Classes.

Appendix B

SOIL HORIZON DESIGNATIONS

ORGANIC HORIZONS

Organic horizons are found in Organic soils, and commonly at the surface of mineral soils. They may occur at any depth beneath the surface in buried soils, or overlying geologic deposits. They contain more than 17% organic carbon (approximately 30% organic matter) by weight. Two groups of these horizons are recognized, O horizons and the L, F, and H horizons.

O This is an organic horizon developed mainly from mosses, rushes, and woody materials.

Of The fibric horizon is the least decomposed of all the organic soil materials. It has large amounts of well-preserved fiber that are readily identifiable as to botanical origin. A fibric horizon has 40% or more of rubbed fiber by volume and a pyrophosphate index of 5 or more. If the rubbed fiber volume is 75% or more, the pyrophosphate criterion does not apply.

Om The mesic horizon is the intermediate stage of decompostion with intermediate amounts of fiber, bulk density and water-holding capacity. The material is partly altered both physically and biochemically. A mesic horizon is one that fails to meet the requirements of fibric or humic.

Oh The humic horizon is the most highly decomposed of the organic soil materials. It has the least amount of fiber, the highest bulk density, and the lowest saturated water-holding capacity. It is very stable and changes very little physically or chemically with time unless it is drained. The humic horizon has less than 10% rubbed fiber by volume and a pyrophosphate index of 3 or less.

LFH These organic horizons developed primarily from leaves, twigs, woody materials and a minor component of mosses under imperfectly to well drained forest conditions.

L This is an organic horizon characterized by an accumulation of organic matter in which the original structures are easily discernible.

F This is an organic horizon characterized by an accumulation of partly decomposed organic matter. The original structures in part are difficult to recognize. The horizon may be partly comminuted by soil fauna as in moder, or it may be a partly decomposed mat permeated by fungal hyphae as in mor.

H This is an organic horizon

characterized by an accumulation of decomposed organic matter in which the original structures are indiscernible. This material differs from the F horizon by its greater humification chiefly through the action of organisms. It is frequently intermixed with mineral grains, especially near the junction with the mineral horizon.

MASTER MINERAL HORIZONS

Mineral horizons are those that contain less than 30% organic matter by weight as specified for organic horizons.

A This is a mineral horizon or horizons formed at or near the surface in the zone of leaching or removal of materials in solution and suspension or of maximum in situ accumulation of organic matter, or both. Included are:

1. horizons in which organic matter has accumulated as a result of biological activity (Ah);
2. horizons that have been eluviated of clay, iron, aluminum, or organic matter, or all of them (Ae);
3. horizons having characteristics of 1) and 2) above but transitional to underlying B or C (AB or A and B);
4. horizons markedly disturbed by cultivation or pasture (Ap).

B This is a mineral horizon or horizons characterized by one or more of the following:

1. an enrichment in silicate clay, iron, aluminum, or humus, alone or in combination (Bt,Bf,Bfh,Bhf, and Bh);
2. a prismatic or columnar structure that exhibits pronounced coatings or stainings and significant amount of exchangeable Na (Bn);
3. an alteration by hydrolysis, reduction, or oxidation to give a change in color or structure from horizons above or below, or both, and does not meet the requirements of 1) and 2) above (Bm,Bg).

C This is a mineral horizon or horizons comparatively unaffected by the pedogenic processes operative in A and B, excepting (i) the process of gleying, and (ii) the accumulation of calcium and magnesium carbonates and more soluble salts (Cca,Csa,Cg, and C). Marl and diatomaceous earth are considered to be C horizons.

R This is consolidated bedrock that is too hard to break with the hands or to dig with a spade when moist and that does not meet the requirement of a C horizon. The boundary between the R layer and overlying unconsolidated material is called a lithic contact.

W This is a layer of water in Gleysolic, Organic, or Cryosolic soils. It is called a hydric layer in Organic soils.

LOWER-CASE SUFFIXES

b Buried soil horizon.

c A cemented (irreversible) pedogenic horizon. The ortstein of a Podzol, and a layer cemented by calcium carbonate and a duripan are examples.

ca A horizon with secondary carbonate enrichment where the concentration of lime exceeds that present in the unenriched parent material. It is more than 10cm thick, and if it has a $CaCO_3$ equivalent of less than 15 percent it should have at least 5 percent more $CaCO_3$ equivalent than the parent material (IC). If it has more than 15 percent $CaCO_3$ equivalent it should have 1/3 more $CaCO_3$ equivalent than the IC. If no IC is present, this horizon is more than 10 cm thick and contains more than 5 percent by volume of secondary carbonates in concretions or soft, powdery forms.

cc Cemented (irreversible) pedogenic concretions.

e A horizon characterized by the eluviation of clay, iron, aluminum, or organic matter alone or in combination. When dry, it is usually higher in color value by 1 or more units than an underlying B horizon. It is used with A (Ae).

f A horizon enriched with amorphous material, principally Al and Fe combined with organic matter. It usually has a hue of 7.5YR or redder or its hue is 10YR near the upper boundary and becomes yellower with depth. When moist, the chroma is higher than 3 or the value is 3 or less. It contains 0.6% or more pyrophosphate-extractable Al+Fe in textures finer than sand and 0.4% or more in sands (coarse sand, sand, fine sand, and very fine sand). The ratio of pyrophosphate-extractable Al+Fe to clay (less than 0.0002mm) is more than 0.05 and organic C exceeds 0.5%. Pyrophosphate-extractable Fe is at least 0.3%, or the ratio of organic C to pyrophosphate-extractable Fe is less than 20, or both are true. It is used with B alone (Bf), with B and h (Bhf), with B and g (Bfg), and with other suffixes. The criteria for "f" do not apply to Bgf horizons. The following horizons are differentiated on the basis of organic carbon content: Bf - 0.5% to 5% organic carbon. Bhf- more than 5% organic carbon.

g A horizon characterized by gray colors, or prominent mottling, or both, indicative of permanent or periodic intense reduction. Chromas of the matrix are generally 1 or less. It is used with A and e (Aeg); with B alone (Bg); with B and f (Bfg); with B, h, and f (Bhfg); with B and t (Btg); with C alone (Cg); with C and k (Ckg); and several others. In some reddish parent materials, matrix colors of reddish hues and high chromas may persist despite long periods of reduction. In these soils, horizons are designated as g if there is gray mottling or if there is marked bleaching on ped faces or along cracks.

Aeg This horizon must meet the definitions of A,e, and g.

Bg These horizons are analogous to Bm horizons but they have colors indicative of poor drainage and periodic reduction. They include horizons occurring between A and C horizons in which the main features are (i) colors of low chroma, that is: chromas of 1 or less, without mottles on ped surfaces or in the matrix if peds are lacking; or chromas of 2 or less in hues of 10YR or redder, on ped surfaces or in the matrix if peds are lacking, accompanied by more prominent mottles than those in the C horizon; or hues bluer than 10Y, with or without mottles on ped surfaces or in the matrix if peds are lacking. (ii) colors indicated in (i) and a change in structure from that of the C horizons. (iii) color indicated in (i) and illuviation of clay too slight to meet the requirements of Bt; or accumulation or iron oxide too slight to meet the limits of Bgf. (iv) colors indicated in (i) and removal of carbonates. Bg horizons occur in some Orthic Humic Gleysols and some Orthic Gleysols.

Bfg, Bhfg, Btg, and others. When used in any of these combinations the limits set for f, hf, t, and others must be met.

Bgf The dithionite-extractable Fe of this horizon exceeds that of the IC by 1% or more. Pyrophosphate-extractable Al + Fe is less than the minimum limit specified for 'f' horizons. This horizon occurs in Fera Gleysols and Fera Humic Gleysols, and possibly below the Bfg of gleyed Podzols. It is distinguished from the Bfg of gleyed Podzols on the basis of the extractability of the Fe and Al. The Fe in the Bgf horizon is thought to have accumulated as a result of the oxidation of ferrous iron. The iron oxide formed is not associated intimately with organic matter or with Al, and it is sometimes crystalline. The Bgf horizons are usually prominently mottled, with more than half of the soil material occurring as mottles of high chroma.

Cg, Ckg, Ccag, Csg, Csag. When g is used with C alone, or with C and one of the lower-case suffixes k, ca, s, or sa, it must meet the definiton for C and for the particular suffix.

h A horizon enriched with organic matter. It is used with A alone (Ah); or with A and e (Ahe); or with B alone (Bh); or with B and f (Bhf).

Ah A horizon enriched with organic matter that either has a color value at least one unit lower than the underlying horizon or contains 0.5% more organic carbon than the IC, or both. It contains less than 17% organic carbon by weight.

Ahe An Ah horizon that has undergone eluviation as evidenced, under natural conditions, by streaks and splotches of differing shades of gray and often by platy structure. It may be overlain by a darker-colored Ah and underlain by a lighter-colored Ae.

Bh This horizon contains more than 1% organic carbon, less than 0.3% pyrophosphate-extractable Fe, and has a ratio of organic carbon to pyrophosphate-extractable Fe of 20 or more. Generally the color value and chroma are less than 3 when moist.

Bhf Defined under 'f'.

j Used as a modifier of the suffixes e, f, g, n, and t to denote an expression of, but failure to meet, the specified limits of the suffix it modifies. It must be placed to the right and adjacent to the suffix it modifies. For example Bfgj means a Bf horizon with weak expression of gleying; Bfjgj means a B horizon with weak expression of both 'f' and 'g' features.

Aej It denotes an eluvial horizon that is thin, discontinuous or slightly discernible.

Btj It is a horizon with some illuviation of clay, but not enough to meet the limits of Bt.

Btgj, Bmgj. Horizons that are mottled but do not meet the criteria of Bg.

Bfj It is a horizon with some accumulation of pyrophosphate-extractable Al and Fe but not enough to meet the limits of Bf.

Bntj or Bnj. Horizons in which development of solonetzic B properties is evident but insufficient to meet the limits for Bn or Bnt.

k Denotes the presence of carbonate, as indicated by visible effervescence when dilute HCl is added. Most often it is used with B and m (Bmk) or C (Ck), and occasionally with Ah or Ap (Ahk, Apk), or organic horizons (Ofk, Omk).

m A horizon slightly altered by hydrolysis, oxidation, or solution, or all three, to give a change in color or structure, or both. It has:

1. Evidence of alteration in one of the following forms:
   a) Higher chromas and redder hues than the underlying horizons.
   b) Removal of carbonates, either partially (Bmk) or completely (Bm).
2. Illuviation, if evident, too slight to meet the requirements of a Bt or a podzolic B.
3. Some weatherable minerals.
4. No cementation or induration and lacks a brittle consistence when moist. This suffix can be used as Bm, Bmgj, Bmk, and Bms.

n A horizon in which the ratio of exchangeable Ca to exchangeable Na is 10 or less. It must also have the following distinctive morphological characteristics: prismatic or columnar structure, dark coatings on ped surfaces, and hard to very hard consistence when dry. It is used with B, as Bn or Bnt.

p A horizon disturbed by man's activities, such as cultivation, logging, habitation, etc. It is used with A and O.

s A horizon with salts, including gypsum, which may be detected as crystals or veins, as surface crusts of salt crystals, by depressed crop growth, or by the presence of salt-tolerant plants. It is commonly used with C and k (Csk), but can be used with any horizon or combination of horizon and lowercase suffix.

sa A horizon with secondary enrichment of salts more soluble than calcium and magnesium carbonates, in which the concentration of salts exceeds that present in the unenriched parent material. The horizon is 10 cm or more thick. The conductivity of the saturation extract must be at least 4 mS/cm and must exceed that of the C horizon by at least one-third.

t An illuvial horizon enriched with silicate clay. It is used with B alone (Bt), with B and g (Btg), with B and n (Bnt), etc.

Bt A Bt horizon is one that contains illuvial layer-lattice clays. It forms below an eluvial horizon, but may occur at the surface of a soil that has been partially truncated. It usually has a higher ratio of fine clay to total clay than IC. It has the following properties:

1. If any part of an eluvial horizon remains and there is no lithologic discontinuity between it and the Bt horizon, the Bt horizon contains more total and fine clay than the eluvial horizons, as follows:

    a) If any part of the eluvial horizon has less than 15% total clay in the fine earth fraction (2mm) the Bt horizon must contain at least 3% more clay, e.g.,Ae 10% clay-Bt minimum 13% clay.

    b) If the eluvial horizon has more than 15% and less than 40% total clay in the fine earth fraction, the ratio of the clay in the Bt horizon to that in the eluvial horizon must be 1.2 or more, e.g., 20% clay increase in the Bt over Ae.

    c) If the eluvial horizon has more than 40% total clay in the fine earth fraction, the Bt horizon must contain at least 8% more clay than the eluvial horizon, e.g. Ae 50% clay; Bt at least 58% clay.

2. A Bt horizon must be at least 5 cm thick. In some sandy soils where clay accumulation occurs in the lamellae, the total thickness of the lamellae should be more than 10 cm in the upper 150 cm of the profile.

3. In massive soils the Bt horizon should have oriented clays in some pores and also as bridges between the sand grains.

4. If peds are present, a Bt horizon shows clay skins on some of the vertical and horizontal ped surfaces and in the fine pores, or shows oriented clays in 1% or more of the cross section, as viewed in thin section.

5. If a soil shows a lithologic discontinuity between the eluvial horizon and the Bt horizon, or if only a plow layer overlies the Bt horizon, the Bt horizon need show only clay skins in some part, either in some fine pores or on some vertical and horizontal ped surfaces. Thin sections should show that some part of the horizon has about 1% or more of oriented clay bodies.

Btj, Btj, and Btg are defined under j and g.

u A horizon that is markedly disrupted by physical or faunal processes other than cryoturbation. Evidence of marked disruption such as the inclusion of material from other horizons, absence of the horizon, etc. must be evident in at least half of the cross section of the pedon. Such turbation can result from blowdown of trees, mass movement of soil on slopes, and burrowing animals. It can be used with any horizon or subhorizon with the exception of A or B alone; e.g. Aeu, Bfu, BCu.

x A horizon of fragipan character. A fragipan is a loamy subsurface horizon of high bulk density and very low organic matter content. When dry, it has a hard consistence and seems to be cemented. When moist, it has moderate to weak brittleness. It frequently has bleached fracture planes and is overlain by a friable B horizon. Air dry clods of fragic horizons slake in water.

y A horizon affected by cryoturbation as manifested by disrupted and broken horizons,, incorporation of materials from other horizons and mechanical sorting in at least half of the cross section of the pedon. It is used with A, B, and C alone or in combination with other subscripts, e.g. Ahy, Ahgy, Bmy, Cy, Cgy, Cygj, etc.

z A frozen layer. It may be used with any horizon or layer, e.g. Ohz, Bmz, Cz, Wz.

Appendix C

DESCRIPTION OF LANDFORMS

C.1 GENETIC MATERIALS

Unconsolidated Mineral Component

The unconsolidated mineral component consists of clastic sediments that may or may not be stratified, but whose particles are not cemented together. They are essentially of glacial or post-glacial origin but include poorly consolidated and weathered bedrock.

Anthropogenic - Man-made or man-modified materials, including those associated with mineral exploitation and waste disposal.

Colluvial - Massive to moderately well stratified, nonsorted to poorly sorted sediments with any range of particle sizes from clay to boulders and blocks that have reached their present position by direct, gravity-induced movement.

They are restricted to products of mass-wasting whereby the debris is not carried by wind, water, or ice (excepting snow avalanches).

Eolian - Sediment, generally consisting of medium to fine sand and coarse silt particle sizes, that is well sorted, poorly compacted, and may show internal structures such as cross bedding or ripple laminae, or may be massive. Individual grains may be rounded and show signs of frosting.

These materials have been transported and deposited by wind action.

Fluvial - Sediment generally consisting of gravel and sand with a minor fraction of silt and clay. The gravels are typically rounded and contain interstitial sand. Fluvial sediments are commonly moderately to well sorted and display stratification, but massive, nonsorted fluvial gravels do occur. These materials have been transported and deposited by streams and rivers. Finer textured Fluvial deposits of modern rivers are termed Alluvium.

Lacustrine - Sediment generally consisting of either stratified fine sand, silt, and clay deposited on the lake bed; or moderately well sorted and stratified sand and coarser materials that are beach and other nearshore sediments transported and deposited by wave action.

These are materials that either have settled from suspension in bodies of standing fresh water or have accumulated at their margins through wave action.

Marine - Unconsolidated deposits of clay, silt, sand, or gravel that are well to moderately well sorted and well stratified to moderately stratified (in some places containing shells). They have settled from suspension in salt or brackish water bodies or have accumulated at their margins through shoreline processes such as wave action and longshore drift.

Morainal - Sediment generally consisting of well compacted material that is nonstratified and contains a heterogeneous mixture of particle sizes, often in a mixture of sand, silt, and clay that has been transported beneath, beside, on, within and in front of a glacier and not modified by any intermediate agent.

Saprolite - Rock containing a high proportion of residual silts and clays formed by alteration, chiefly by chemical weathering.

The rock remains in a coherent state, interstitial grain relationships are undisturbed and no downhill movement due to gravity has occurred.

Undifferentiated - A layered sequence of more than three types of genetic material outcropping on a steep erosional escarpment.

Volcanic - Unconsolidated pyroclastic sediments. These include volcanic dust, ash, cinders, and pumice.

Qualifying Descriptors

These have been introduced to qualify the genetic materials and to supply additional information about the mode of formation or depositional environment.

Glacial - Used to qualify nonglacial genetic materials or process modifiers where there is direct evidence that glacier ice exerted a strong but secondary or indirect control upon the mode of origin of the materials or mode of operation of the process. The use of this qualifying descriptor implies that glacier ice was close to the site of the deposition of a material or the site of operation of a process.

Glaciofluvial - Fluvial materials showing clear evidence of having been deposited either directly in front of or in contact with glacier ice.

Glaciolacustrine - Lacustrine materials deposited in contact with glacial ice.

Glaciomarine - Materials of glacial origin laid down in a marine environment, as a result of settling from melting, floating ice and ice shelves.

Organic Component

The organic component consists of peat deposits containing >30% organic matter by weight that may be as thin as 10 cm if they overlie bedrock but are otherwise greater than 40 cm and generally greater than 60 cm thick. The classes and their definitions follow.

B	Bog
N	Fen
S	Swamp

Bog - A bog is a peat-covered or peat-filled area, generally with a high water table. Since the surface of the peatland is slightly elevated, bogs are either unaffected or partly affected by nutrient-rich groundwaters from the surrounding mineral soils. The groundwater is generally acidic and low in nutrients (ombrotrophic). The dominant peat materials are sphagnum and forest peat, underlain, at times, by fen peat.

Fen - A fen is a peat-covered or peat-filled area with a high water table, which is usually at the surface. The dominant materials are shallow to deep, well to moderately decomposed fen peat. The waters are mainly rich in nutrients (minerotrophic) and are derived from mineral soils. The peat materials are therefore higher in both nutrients and pH than the peats associated with bogs.

Swamp - A swamp is a peat-covered or peat-filled area. The peat surface is level or slightly concave in cross section. The water table is frequently at or above the peat surface. There is strong water movement from margins or other mineral sources. The microrelief is hummocky, with many pools present. The waters are neutral or slightly acid. The dominant peat materials are shallow to deep mesic to humic forest and fen peat.

C.2 GENETIC MATERIAL MODIFIERS

Material modifiers are used to qualify unconsolidated mineral and organic deposits. Particle-size classes serve to indicate the size, roundness, and sorting of unconsolidated mineral deposits. Fiber classes indicate the degree of decomposition and fiber size of organic materials.

Particle Size Classes for Unconsolidated Mineral Materials

Blocky: An accumulation of angular particles greater than 256 mm in size.

Bouldery: An accumulation of rounded particles greater than 256 mm in size.

Clayey: An accumulation of particles where the fine earth fraction contains 35% or more clay (<0.002 mm) by weight and particles greater than 2 mm are less than 35% by volume.

Cobbly: An accumulation of rounded particles having a diameter of 64-256 mm.

Gravelly: An accumulation of rounded particles ranging in size from pebbles to boulders.

Loamy: An accumulation of particles of which fine earth fraction contains 35% or more clay (<0.002 mm) by weight and particles greater than 2 mm are less than 35% by volume.

Pebbly: An accumulation of rounded particles having a diameter of 2-64 mm.

Rubbly: An accumulation of angular fragments having a diameter of 2-256 mm.

Sandy: An accumulation of particles of which the fine earth fraction contains more than 70% by weight of fine sand or coarser particles. Particles greater than 2 mm occupy less than 35% by volume.

Silty: An accumulation of particles of which the fine earth fraction contains less than 15% of fine sand or coarser particles and has less than 35% clay. Particles greater than 2 mm occupy less than 35% by volume.

Fiber Classes for Organic Materials

The amount of fiber and its durability are important characterizing features of organic deposits in that they reflect on the degree of decomposition of the material. The prevalence of woody materials in peats is also of prime importance.

Fibric:The least decomposed of all organic materials; there is a large amount of well-preserved fiber that is readily identifiable as to botanical origin. Fibers retain their character upon rubbing.

Mesic: Organic material in an intermediate stage of decompostion; intermediate amounts of fiber are present that can be identified as to their botanical origin.

Humic: Highly decomposed organic material; small amounts of fiber are present that can be identified as to their botanical origin. Fibers can be easily destroyed by rubbing.

Woody: Organic material containing more than 50% of woody fibers.

C.3 SURFACE EXPRESSION

The surface expression of genetic materials is their form (assemblage of slopes) and pattern of forms. Form as applied to unconsolidated deposits refers specifically to the product of the initial mode of origin of the materials. When applied to consolidated materials, form refers to the product of their modification by geological processes. Surface expression also indicates the manner in which unconsolidated genetic materials relate to the underlying unit.

Consolidated and Unconsolidated Mineral Surface Classes

Apron - A relatively gently slope at the foot of a steeper slope and formed by materials from the steeper, upper slope.

Blanket - A mantle of unconsolidated materials thick enough to mask minor irregularities in the underlying unit but still conforming to the general underlying topography.

Fan - A fan-shaped form similar to the segment of a cone and having a perceptible gradient from the apex to the toe.

Hummocky - A very complex sequence of slopes extending from somewhat rounded depressions or kettles of various sizes to irregular to conical knolls or knobs. There is a general lack of concordance between knolls or depressions. Slopes are generally 9-70% (5-35 degrees).

Inclined - A sloping, unidirectional surface with a generally constant slope not broken by marked irregularities. Slopes are 2-70% (1-35 degrees). The form of inclined slopes is not related to the initial mode of origin of the underlying material.

Level - A flat or very gently sloping, unidirectional surface with a generally constant slope not broken by marked elevations and depressions. Slopes are generally less than 2% (1 degree).

Rolling - A very regular sequence of moderate slopes extending from rounded, sometimes confined concave depressions to broad, rounded convexities producing a wavelike pattern of moderate relief. Slope length is often 1.6 km or greater and gradients are greater than 5% (3 degrees).

Ridged - A long, narrow elevation of the surface, usually sharp crested with steep sides. The ridges may be parallel, subparallel, or intersecting.

Steep - Erosional slopes, greater than 70% (35 degrees), on both consolidated and unconsolidated materials. The form of a steep erosional slope on unconsolidated materials is not related to the initial mode of origin of the underlying material.

Terraced - Scarp face and the horizontal or gently inclined surface (tread) above it.

Undulating - A very regular sequence of gentle slopes that extends from rounded, sometimes confined concavities to broad rounded convexities producing a wavelike pattern of low local relief. Slope length is generally less than 0.8 km and the dominant gradient of slopes is 2-5% (1-3 degrees).

Veneer - Unconsolidated materials too thin to mask the minor irregularities of the underlying unit surface. A veneer will range from 10 cm to 1 m in thickness and will possess no form typical of the materials's genesis.

Organic Surface Classes

Blanket - A mantle of organic materials that is thick enough to mask minor irregularities in the under-lying unit but still conforms to the general under-lying topography.

Bowl - A bog or fen occupying concave-shaped depressions.

Domed - A bog with an elevated, convex, central area much higher than the margin. Domes may be abrupt (with or without a frozen core) or gently sloping or have a stepped surface.

Floating - A level organic surface associated with a pond or lake and not anchored to the lake bottom.

Horizontal - A flat peat surface not broken by marked elevations and depressions.

Plateau - A bog with an elevated, flat, central area only slightly higher than the margin.

Ribbed - A pattern of parallel or reticulate low ridges associated with fens.

Sloping - A peat surface with a generally constant slope not broken by marked irregularities.

Veneer - A thin (40 to 100 cm) mantle of organic materials which generally conforms to the underlying topography. They may or may not be associated with discontinuous permafrost.

Appendix D

SOIL CORRELATION OF THE RURAL MUNICIPALITIES OF STE ANNE, LA BROQUERIE AND PART OF LGD OF STUARTBURN WITH THE SOILS OF THE WINNIPEG AND MORRIS MAP SHEET AREAS, REPORT NO. 5., 1953

The soil units of the area surveyed differ considerably from those reported for the same area in the Survey of the Winnipeg Morris Map Sheet, Report No. 5. The present study is intended to update a portion of the former reconnaissance survey, which because of mapping scale, is to small to show many important local soils, and which is out of date with respect to the present state of knowledge of soils and systems of soil classification. This new more detailed survey benefits from advantages derived from: more intensive examination of soils in the field, use of larger mapping scale which allows for more delineations of many important local soils, use of modern aerial photographs and use of improved methods of studying soils in the laboratory.

The reconnaissance survey of the Winnipeg and Morris map sheet areas, were carried out with the object of obtaining a general picture of the soils that occured in the area and of ascertaining their general character and distribution. Each map unit shown, in most cases, is a compound mapping unit that consists of a group of related soils derived from similar parent material, and occuring under similar climatic conditions. It is known as a soil association. It usually has a dominant soil type interspersed with a number of local soil types of minor importance. While soil associations are the most commonly used in the Winnipeg-Morris map: local associated soils and textural class phases are occasionally designated separately. The soils of minor importance found in association with the typical or dominant soils are noted in the soil descriptions.

The more detailed survey of the project area employs simple mapping units where the soil series is used, rather than the soil association as the basis for identifying, classifying and delineating soils. The scale of mapping in this study is much greater than that used in the former reconnaissance study, permitting the delineation of narrow differences in soil texture, as well as chemical and physical properties. In particular, differences in the stratigraphy of surface deposits, depth and type of soil profile, degree of erosion, slope or relief, stoniness and salinity are emphasized.

The correlation of the soil series of the resurveyed area with corresponding soil associations of the former reconnaissance Winnipeg and Morris map sheet areas is outlined in the Accompanying Table 9. The soil associations are described in the Reconnaissance Soil Survey of Winnipeg and Morris Map Sheet Areas, Report No. 5, 1953.

TABLE 9

Correlation of Soil Series of the RM's of Ste. Anne, and La Broquerie and part of the LGD of Stuartburn with Equivalent Soil Associations, Soil Complexes, and Soil Associates of the (1953) Winnipeg - Morris Area.

Map Symbol	Soil Series Name and Subgroup	Winnipeg - Morris Association or Complex	(1953) Report No. 5 Associate	Remarks
AND	Aneda Orthic Dark Gray	Garson Complex	Well drained Gray - Black	Garson complex include well to imperfectly drained genetic soil types ranging from Dark Gray Chernozems thru eluviated Eutric Brunisols to Gray Luvisols
BAM	Balmoral Rego Humic Gleysol	Lakeland (Heavy) Association	Poorly drained Calcic Meadow	Lakeland Association include well to poorly drained profiles
BVR	Beaverdam Gleyed Dark Gray	Leary Association	Imperfectly drained Gray Black	Leary parent material definition includes shallow gravelly deposit
BLO	Berlo Gleyed Dark Gray Gray	Poppleton Association	Imperfectly drained Gray Black	Poppleton Association include well to poorly drained profile
BYD	Berry Island Rego Humic Gleysol	Leary Association	Poorly drained Meadow	See Beaverdam Series
CIO	Caliento Gleyed Gray Luvisol	Pine Ridge Association	Imperfectly drained Humid Gray Wooded	The Pine Ridge Association include well to imperfectly drained genetic soil types ranging from Dark Gray Chernozems to Gray Luvisols
CAY	Cayer	Half bog		Half bog is an undefined complex of organic deposits 25 to 75 cm deep, made up of fen, woody or mixed peat
CRN	Crane Terric Mesisol	Half bog		See Cayer Series
DVD	Davidson Orthic Dark Gray	Poppleton Association	Well drained Gray Black	The Davidson soil is equivalent to the well drained member of the Poppleton Association
FOY	Foley Rego Humic Gleysol	Lakeland Association	Poorly drained Meadow	The Foley Series is the poorly drained associate of the Lakeland (light) Association
FYL	Fyala Rego Humic Gleysol	Osborne Associate	Poorly drained associate	Fyala occur in Dark Gray areas in association with the Pequis Association
GSO	Garson Orthic Gray Luvisol	Garson Complex	Well drained Gray Wooded	See Aneda Series

Table 9. Cont'd

Map Symbol	Soil Series Name and Subgroup	Winnipeg - Morris Association or Complex	(1953) Report No. 5 Associate	Remarks
GRX	Giroux Gleyed Dark Gray	Pelan Association deep phase	Imperfectly drained Gray Black	The Giroux soil is local soil included in with Pelan deep phase, which is sand over till
GNL	Glenella Gleyed Rego Black	Lakeland (light) Association	Imperfectly drained Blackearth	The Glenella is a local soil included in with Lakeland (light) Association
GEW	Greenwald Gleyed Dark Gray	Lakeland (light) Association	Imperfectly drained Blackearth	See Glenella Series
GDT	Grindstone Terric Mesisol	Half bog		See Cayer Series
GLK	Gull Lake Dark Gray Luvisol	Birds Hill Association	Well drained Gray Wooded	Birds Hill parent materials includes shallow gravelly deposits over calcareous glacial till
GUO	Gunton Orthic Dark Gray	Leary Association	Well drained Gray Black	Leary parent materials definition includes shallow gravelly deposits
IWO	Inwood Gleyed Dark Gray	Garson Complex	Imperfectly drained Gray Black	See Aneda Series
JUS	Julius Typic Fibrisol	Bog		Bog is an undefined organic deposit greater than 75 cm deep made up of fen, woody or mixed peats
KRW	Kergwenan Gleyed Dark Gray	Leary Association	Imperfectly drained Gray Black	Leary Association includes well to poorly drained members
KPN	Kiplin Gleyed Dark Gray	Riverdale Association	Imperfectly drained Gray Black	The Riverdale Association have profile developed on alluvial river terraces
KIC	Kircro Terric Mesisol	Half bog		See Cayer Series
KLI	Kline Rego Humic Gleysol	Marquette Association	Poorly drained Blackearth Meadow	The Marquette Association includes well to poorly drained members
LAB	La Broquerie Gleyed Cumulic Regosol	Alluvium	Imperfectly drained	No profile has developed in the Alluvium parent material
LYW	Ladywood Gleyed Dark Gray	Lakeland (light) Association	Imperfectly drained Gray Black	Ladywood Series is the fine sandy loam, imperfectly drained member of the Lakeland Association

Table 9. Cont'd

Map Symbol	Soil Series Name and Subgroup	Winnipeg - Morris Association or Complex	(1953) Report No. 5 Associate	Remarks
LAM	Lambert Rego Humic Gleysol	Poppleton Association	Poorly drained Meadow, Gray Black	Lambert Series is the poorly drained member of the Poppleton Association
LRY	Leary Orthic Dark Gray	Leary Association	Well drained Gray Black	Leary Association includes well to poorly drained members
LSW	Lenswood Gleyed Rego Black	Springbank Association	Imperfectly drained Blackearth-Meadow	Lenswood Series is the imperfectly drained member of the Springbank Association
LSD	Lonesand Gleyed Degraded Dystric Brunisol	Menisino	Imperfectly drained Podzol	Lonesand Series equates to what was thought to be a siliceous sandy Podzol
LGP	Long Point Orthic Gray Luvisol	Birdshill Association	Well drained Gray Wooded	Birdshill parent material definition includes shallow gravelly deposits
MNT	Malonton Rego Humic Gleysol	Poppleton Association	Poorly drained, Meadow Gray Black	Malonton Series is the poorly drained member of the Poppleton Association
MAR	Marchand Rego Humic Gleysol	Alluvium	Poorly drained, Gray Black	Marchand Series differs from the very similar Malonton Series in that its fluvial parent material is layered and variable in texture
MRQ	Marquette Gleyed Rego Black	Marquette Association	Imperfectly drained Blackearth-Meadow	The Marquette Series is the dominant member of the Marquette Association
MLI	McKinley Rego Humic Gleysol	Lakeland (light) Association	Poorly drained Blackearth-Meadow	McKinley Series is a local soil included in Lakeland (light) Association
MEB	Meleb Rego Humic Gleysol	Garson Complex	Poorly drained Blackearth-Meadow	See Aneda Series
MRS	Morris Gleyed Solonetzic Black	Red River Association	Imperfectly drained Solodized Solonetzic Meadow type	The Morris Series is the imperfectly drained Solodized associate of the Red River Association
NIV	Niverville Gleyed Rego Black	Steinbach Association	Imperfectly drained Blackearth-Meadow	Niverville is a local soil included with the Steinbach Association
NUS	Nourse Gleyed Dark Gray	Steinbach Association	Imperfectly drained Gray Black	See Niverville Series
OBO	Osborne Rego Humic Gleysol	Red River Association	Poorly drained Blackearth-Meadow	Osborne Series is the poorly drained Osborne Associate, of the Red River Association

Table 9. Cont'd

Map Symbol	Soil Series Name and Subgroup	Winnipeg - Morris Association or Complex	(1953) Report No. 5 Associate	Remarks
OVO	Overflowing Hydric Mesisol	Bog or Marsh	Very poorly drained Bog and Half Bog	Overflowing Series is included with Bog and Half Bog, undefined organic deposits
PAN	Pansy Gleyed Eluviated Eutric Brunisol	Pine Ridge	Imperfectly drained Gray Wooded	Pansy Series is a local soil included in both the Pine Ridge and Menisino Association
PGE	Partridge Creek Rego Humic Gleysol	Semple Association	Poorly drained Gray Black Meadow	Partridge Creek is the poorly drained associate of the Semple Association
PGU	Peguis Gleyed Dark Gray	Peguis Association	Imperfectly drained Gray Black	Peguis Series is the dominant series included in the Peguis Association
PLN	Pelan Gleyed Dark Gray	Pelan Association	Imperfectly drained Gray Black	The Pelan Series correlates with the Pelan Association deep phase is 40 to 75 cm of sand material over till
PMU	Pineimuta Rego Humic Gleysol	Woodlands Complex	Poorly drained Blackearth-Meadow	Pineimuta correlates with the poorly drained associate of the Woodlands Complex
PRC	Pine Ridge Eluviated Eutric Brunisol	Pine Ridge Association	Well drained Gray Wooded	Pine Ridge Association includes well to imperfectly drained genetic soil types ranging from Eluviated Eutric Brunisols, some Dystric Brunisols and Gray Luvisols. The Pine Ridge Series is the dominant member of this Association
PIY	Piney Gleyed Gray Luvisol	Garson Complex	Imperfectly drained Gray Wooded	See Aneda Series
PPL	Poppleton Gleyed Dark Gray	Poppleton Association	Imperfectly drained Gray Black	Poppleton Series is the dominant member of the Poppleton Association
PRA	Prawda Rego Humic Gleysol	Pelan Association deep phase	Poorly drained Gray Black	See Giroux Series
RAT	Rat River Terric Mesisol	Half Bog		See Cayer Series
RIV	Red River Gleyed Rego Black	Red River Association	Imperfectly drained Blackearth-Meadow	Red River Series is the dominant member of the Red River Association
RRV	Reed River Terric Humisol	Half Bog		See Cayer Series
SLB	St. Labre Orthic Gray Luvisol	Pine Ridge Association	Well drained Gray Wooded	St. Labre is a local soil included in the Pine Ridge Association where shallow sandy sediments overlie cobbly, extremely calcareous till

Table 9. Cont'd

Map Symbol	Soil Series Name and Subgroup	Winnipeg - Morris Association or Complex	(1953) Report No. 5 Associate	Remarsk
SDI	Sandilands Eluviated Dystric Brunisol	Menisino	Well drained Podzol	Sandilands Series is the dominant member of the Menisino Association
SCY	Scanterbury Gleyed Black	Red River Association	Imperfectly drained Blackearth	Scanterbury Series is a significant inclusion in the Red River Association and is found in close association with Red River Series
SRE	Seine River Gleyed Cumulic Regosol	Alluvium	Imperfectly drained	Alluvium is an undefined complex of soils which include Seine River Series
SIK	Sirko Gleyed Gray Luvisol	Birds Hill Association	Imperfectly drained Gray Wooded	Sirko Series is as significant inclusion in the Birds Hill Association
SPG	Sprague Rego Humic Gleysol	Pelan Association deep	Poorly drained Gray Black Meadow	Sprague Series is a significant inclusion in the Pelan (deep) Association
SRL	Spearhill Gleyed Rego Dark Gray	Leary Association	Imperfectly drained	Spearhill Series is a significant inclusion in the Leary Association
SUJ	South Junction Terric Humisol	Half bog		See Cayer Series
STD	Stead Typic Mesisol	Bog		See Julius Series
SUW	Sundown Rego Humic Gleysol	Leary Association	Poorly drained Gray Black-Meadow	Sundown Series is a significant inclusion in the Leary Association
THG	Thalberg Gleyed Solonetzic Dark Gray	St. Norbert Association	Imperfectly drained Gray Black	Thalberg Series is a significant inclusion in the St. Norbert Association
VLW	Venlaw Orthic Dark Gray Luvisol	Birds Hill Association	Well drained Gray Wooded	Venlaw is a significant inclusion in the Birds Hill Association
VIT	Vita Gleyed Gray Luvisol	Birds Hill	Imperfectly drained	Vita Series is a significant inclusion in the Birds Hill Association

Table 9. Cont'd

Map Symbol	Soil Series Name and Subgroup	Winnipeg - Morris Association or Complex	(1953) Report No. 5 Associate	Remarks
WDN	Weiden Rego Humic Gleysol	Zora Association (light)	Poorly drained	Weiden is a significant inclusion in the Zora (light) Association
WCE	Wintergreen Gleyed Gray Luvisol	Pine Ridge Association	Imperfectly drained Gray Wooded	Wintergreen Series is a minor inclusion in the Pine Ridge Association
WOM	Woodmore Gleyed Dark Gray	Zora Association (light)	Imperfectly drained Gray Black	Woodmore is a significant inclusion in the Zora (light) Association
WOG	Woodridge Orthic Gray Luvisol	Birds Hill Association	Well drained Gray Wooded	Woodridge Series is a significant inclusion in the Birds Hill Association
ZHD	Zhoda Orthic Dark Gray Luvisol	Pine Ridge Association	Well drained Gray Wooded	Zhoda is a minor inclusion in the Pine Ridge Association

Appendix E

GUIDES FOR ASSESSING SOIL SUITABILITY FOR SELECTED ENGINEERING AND RECREATION USES

TABLE 10

Land Classification Standards for Irrigation Suitability

Land Characteristics	Subclass	Class 1 - Very Good	Class 2 - Good	Class 3 - Fair	Class 4 - Poor
SOILS	S				
Texture very coarse textured very fine textured	v h	Fine sandy loams to clay loams	Loamy fine sand to light clay	Sand to permeable clay	Gravel to clay
Water holding capacity low available moisture capacity	q	40 to 60 sat. % >15cm storage in 1.2m <10cm/hr. hydraulic cond.	35 to 65 sat. % >12.5cm storage in 1.2m <12.5cm/hr. hydraulic cond.	25 to 75 sat. % >7.5cm storage in 1.2m <17.5cm/hr. hydraulic cond.	<25 or >75 sat. % <7.5cm storage in 1.2m >17.5cm/hr. hydraulic cond.
Geological Deposit shallow deposit over sand or gravel	k	.9m or more of fine sandy loam or heavier	.6m or more of fine sandy loam or heavier, or .75m plus of loamy fine sand or sandy loam	.5m or more of sandy loam or heavier, or .6m plus of loamy sand	<.5m of sandy loam or heavier, or .6m of loamy sand or sand
shallow deposit over impervious substrata	b	>3m of permeable material	>2m of permeable material	>1m of permeable material	<1m of permeable material
Salinity and Alkalinity[1,2]	a	<4 ms/cm in 0-.6m <8 ms/cm below .6m <6 S.A.R.	<4 ms/cm in 0-.6m <12 ms/cm below .6m <8 S.A.R.	<8 ms/cm in 0-.6m <15 ms/cm below .6m <12 S.A.R.	>8 ms/cm in 0-.6m >15 ms/cm below .6m >12 S.A.R.
EXTERNAL FEATURES Stones - rock clearing	r	None to light clearing	Light to medium clearing	Light to heavy clearing	Excessively stony
Topography Slope excess gradient	T s	<1% and 0.1% in general gradient (0-3% slope)	<3% in general gradient (3-5% slope)	<5% in general gradient (5-10% slope)	>5% in general* gradient (>10% slope)**
DRAINAGE restricted outlet	D	No problem anticipated	Moderate drainage problem anticipated but may be improved at relatively low cost	Moderate to severe drainage problem anticipated but may be improved by expensive but feasible measures	Drainage improvement not considered feasible
water table		below 2.4m most of year	could be above 1.5m for a short period, then recedes to 2.4m or lower	within 1.5m most of year	within 1m most of year

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* Criteria for gravity (flood) irrigation requirements.

** Estimated adjustments to slope criteria for overhead or sprinkler type irrigation methods.

[1] If sufficient gypsum is present in the soil, the S.A.R. may be lowered by leaching the soil (a very slow process), and the hydraulic conductivity may then improve.

[2] The degree of salinity may vary widely within short distances, and there may be no clear indication of the area occupied by each salinity class. Unless a very detailed mapping and sampling program is carried out, it is impossible to estimate the acreage occupied by each salinity class.

TABLE 11

Guide for assessing soil suitability as source of topsoil

The term "topsoil" includes soil materials used to cover barren surfaces exposed during construction, and materials used to improve soil conditions on lawns, gardens, flower beds, etc. The factors to be considered include not only the characteristics of the soil itself, but also the ease or difficulty of excavation, and where removal of topsoil is involved, accessibility to the site.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
u	Moist Consistence[2]	Very friable, friable	Loose, firm	Very firm	Cemented
i	Flooding	None	May flood occasionally for short periods	Frequent flooding	Constantly flooded
w	Wetness[2]	Wetness is not determining if better than very poorly drained.			Very poorly drained and permanently wet soils
t	Slope	0-5%	5-9%	9-15%	>15%
p	Stoniness[2]	Stones 10 m apart (Class 0 and 1)	Stones 2-10 m apart (Class 2)	Stones 0.1-2 m apart (Class 3 and 4)	Stones 0.1 m apart (Class 5)
c	Coarse fragments[2]: percent, by volume	<3%	3-15%	15-35%	>35%
s	Texture[2]	FSL, VFSL, L, SiL, SL, SC if 1:1 clay is dominant	CL, SCL, SiCL, SC if 2:1 clay is dominant; c and sic if 1:1 clay is dominant	S, LS, C and SiC if 2:1 clay is dominant. organic soils[3]	Marl, diatomaceous earth
b	Depth of Topsoil[4]	>40 cm	15-40 cm	8-15 cm	<8 cm
n	Salinity of Topsoil[5]	E.C. 0-1	E.C. 1-4	E.C. 4-8	E.C. >8

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[1] The symbols are used to indicate the nature of the limitation.

[2] For an explanation of texture, consistence, stoniness, coarse fragments and soil drainage classes, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[3] Non-woody organic materials are assessed as good sources for topsoil if mixed with or incorporated into mineral soil.

[4] The remaining soil material (at least 8 cm) must be reclaimable after the uppermost soil is removed.

[5] E.C. = Electrical Conductivity (millisiemens/cm).

TABLE 12

Guide for assessing soil suitability as source of sand and gravel

The purpose of this table is to provide guidance for assessing the probable supply as well as quality of the sand or gravel for use as road base material and in concrete. The interpretation pertains mainly to the characteristics of the soil substratum to a depth of 150 cm, augmented by observations made in deep cuts as well as geological knowledge where available.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
a	Unified Soil Group	SW SP GW GP	SW-SM SP-SM GP-GM GW-GM	SM SW-SC SP-SC GM GP-GC GW-GC	All other groups and bedrock
h	Depth to Seasonal Water Table	Not class determining if deeper than 50 cm		50 cm	
q	Depth to Sand and Gravel	<25 cm	25-75 cm[2]	>75 cm[2]	
p	Stoniness[3]	Not class determining if stones >.5 m apart (Class 0, 1, 2 and 3)		Stones 0.1-0.5 m apart (Class 4)	Stones <0.1 m apart (Class 5)
d	Depth to Bedrock	>100 cm	50-100 cm	<50 cm	

[1] The symbols are used to indicate the nature of the limitation.

[2] Rated good if it is known that the underlying gravel or sand deposit is thick (>100 cm).

[3] For an explanation of stoniness and rockiness, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

TABLE 13

Guide for assessing soil suitability as source of roadfill

Fill material for buildings or roads are included in this use. The performance of the material when removed from its original location and placed under load at the building site or road bed are to be considered. Since surface materials are generally removed during road or building construction their properties are disregarded. Aside from this layer, the whole soil to a depth of 150-200 cm should be evaluated. Soil materials which are suitable for fill can be considered equally suited for road subgrade construction.

Symbol[1]	Items Affecting Use[2]	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
s	Subgrade[3]				
	a. AASHO group index[4]	0-4	5-8	>8	
	b. Unified soil classes	GW, GP, SW, SP, SM, GC[5] and SC[5]	CL (with P.I.[6] <15) and ML	CL (with P.I.[6] of 15 or more), CH and MH[7]	OL, OH and Pt
l	Shrink-swell potential	Low	Moderate	High	
f	Susceptibility to frost action[8]	Low	Moderate	High	
t	Slope	0-15%	15-30%	30-45%	>45%
p	Stoniness[9]	Stones >2 m apart (Class 0, 1 and 2)	Stones 0.5-2 m apart (Class 3)	Stones 0.1-0.5 m apart (Class 4)	Stones <0.1 m apart (Class 5)
r	Rockiness[9]	Rock exposures >35 m apart and cover <10% of the surface	Rock exposure 10-35 m apart and cover 10-25% of the surface	Rock exposure 3.5-10 m apart and cover 25-50% of the surface	Rock exposures <3.5 m apart and cover 50-90% of the surface
w	Wetness[9]	Excessively drained to moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained or permanently wet soils
d	Depth to Bedrock	>100 cm	50-100 cm	20-50 cm	<20 cm
h	Depth to Seasonal Water Table	>150 cm	75-150 cm	50-75 cm	<50 cm

[1] The symbols are used to indicate the nature of the limitation.

[2] The first three items pertain to soil after it is placed in a fill; the last six items pertain to soil in its natural condition before excavation for road fill.

[3] This item estimates the strength of the soil material, that is, its ability to withstand applied loads.

[4] Use AASHO group index only where laboratory data are available for the kind of soil being rated; otherwise, use Unified soil groups.

[5] Downgrade suitability rating to fair if content of fines is more than about 30 percent.

[6] P.I. means plasticity index.

[7] Upgrade suitability rating to fair if MH is largely kaolinitic, friable, and free of mica.

[8] Use this item only where frost penetrates below the paved or hardened surface layer and where moisture transportable by capillary movement is sufficient to form ice lenses at the freezing front.

[9] For an explanation of stoniness, rockiness and soil drainage classes, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

TABLE 14

Guide for assessing soil suitability for permanent buildings

This guide applies to undisturbed soils to be evaluated for single-family dwellings and other structures with similar foundation requirements. The emphasis for rating soils for buildings is on foundation requirements; but soil slope, susceptibility to flooding and other hydrologic conditions, such as wetness, that have effects beyond those related exclusively to foundations are considered too. Also considered are soil properties, particularly depth to bedrock, which influence excavation and construction costs for the building itself and for the installation of utility lines. Excluded are limitations for soil corrosivity, landscaping and septic tank absorption fields.

Symbol[2]	**Items Affecting Use**	**Degree of Soil Suitability**[3]			
		Good - G	**Fair - F**	**Poor - P**	**Very Poor - V**
w	Wetness[4]	With Basements: Very rapidly, rapidly and well drained. Without Basements: Very rapidly, rapidly, well and moderately well drained.	With Basements: Moderately well drained. Without Basements: Imperfectly drained.	With Basements: Imperfectly, poorly, and very poorly drained. Without Basements: Poorly and very poorly drained.	With Basements: Permanently wet soils. Without Basements: Permanently wet soils.
h	Depth to Seasonal Water Table	With Basements: >150 cm Without Basements: >75 cm	With Basements: 75-150 cm Without Basements: 50-75 cm	With Basements: 25-75 cm Without Basements: 25-50 cm	With Basements: <25 cm Without Basements: <25 cm
i	Flooding	None	None	Occasional flooding (once in 5 years)	Frequent flooding (every year)
t	Slope[5]	0-9%	9-15%	15-30%	>30%
a	Subgrade[6]				
	a. AASHO group index[7]	0-4	5-8	>8	
	b. Unified soil classes	GW, GP, SW, SP, SM and GC and SC	CL (with P.I.[8] <15) and ML	CL (with P.I.[8] of 15 or more), CH and MH	OH, OL and Pt
f	Potential Frost Action[9]	Low (F1, F2)	Moderate (F3)	High (F4)	
p	Stoniness[4]	Stones >10 m apart (Class 0 to 1)	Stones 2-10 m apart (Class 2[10])	Stones 0.1-2 m apart (Class 1[10] to 4)	Stones <0.1 m apart (Class 5[10])
r	Rockiness[4],[11]	Rock exposures >100 m apart and cover < 2% of the surface	Rock exposures 30-100 m apart and cover 2-10% of the surface	Rock exposures <30 m apart and cover >10% of the surface	Rock exposures too frequent to allow location of permanent buildings
d	Depth to Bedrock[11]	With Basements: >150 cm Without Basements: >100 cm	With Basements: 100-150 cm Without Basements: 50-100 cm	With Basements: 50-100 cm Without Basements: <50 cm	With Basements: <50 cm

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[1] By halving the slope limits, this table can be used for evaluating soil suitability for buildings with large floor areas, but with foundation requirements not exceeding those of ordinary three-storey dwellings.

[2] The symbols are used to indicate the nature of the limitation.

[3] Some soils assessed as fair or poor may be good sites from an aesthetic or use standpoint, but they will require more site preparation and/or maintenance.

[4] For an explanation of rockiness, stoniness and soil drainage classes, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[5] Reduce the slope limits by one half for those soils subject to hillside slippage.

[6] This item estimates the strength of the soil, that is, its ability to withstand applied loads. When available, AASHO Group Index values from laboratory tests were used; otherwise the estimated Unified classes were used.

[7] Group index values were estimated from information published by the Portland Cement Association (PCA, 1962), pp. 23-25.

[8] P.I. means plasticity index.

[9] Frost heave only applies where frost penetrates to the assumed depth of the footings and the soil is moist. The potential frost action classes are taken from the United States Army Corps of Engineers (1962), pp. 5-8.

[10] Rate one class better for buildings without basements.

[11] Rate one class better if the bedrock is soft enough so that it can be dug with light power equipment such as backhoes.

TABLE 15

Guide for assessing soil suitability for local roads and streets

This guide applies to soils to be evaluated for construction and maintenance of local roads and streets. These are improved roads and streets having some kind of all-weather surfacing, commonly asphalt or concrete, and are expected to carry automobile traffic all year. They consist of: (1) the underlying local soil material (either cut or fill) called the subgrade; (2) the base material of gravel, crushed rock, or lime or soil cement stabilized soil called the subbase; and (3) the actual road surface or pavement, either flexible or rigid. They also are graded to shed water and have ordinary provisions for drainage. With the probable exception of the hardened surface layer, the roads and streets are built mainly from the soil at hand, and cuts and fills are limited, usually less than 2 meters. Excluded from consideration in this guide are highways designed for fast-moving, heavy trucks.

Properties that affect design and construction of roads and streets are: (1) those that affect the load supporting capacity and stability of the subgrade, and (2) those that affect the workability and amount of cut and fill. The AASHO and Unified Classification give an indication of the traffic supporting capacity. Wetness and flooding affect stability. Slope, depth of hardrock, stoniness, rockiness, and wetness affect the ease of excavation and the amount of cut and fill to reach an even grade.

Symbol[2]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
w	Wetness[3]	Very rapidly, rapidly, well and moderately well drained	Imperfectly drained	Poorly and very poorly drained	Permanently wet soils
i	Flooding	None	Infrequent (once in 5 years)	Occasional (once in 2-4 years)	Frequent (every year)
t	Slope	0-9%	9-15%	15-30%	>30%
d	Depth to Bedrock[4]	>100 cm	50-100 cm	<50 cm	
s	Subgrade[5]				
	a. AASHO group index[6]	0-4	5-8	>8	
	b. Unified soil classes	GW, GP, SW, SP, SM, GC[7] and SC[7]	CL (with P.I.[8] < 15) and ML	CL (with P.I.[8] of 15 or more), CH and MH	OH, OL and Pt
f	Susceptibility to Frost Heave[9]	Low (F1, F2)	Moderate (F3)	High (F4)	
p	Stoniness[3]	Stones >2 m apart (Class 0 to 2)	Stones 0.5-2 m apart (Class 3)	Stones 0.1-0.5 m apart (Class 4)	Stones <0.1 m apart (Class 5)
r	Rockiness[3]	Rock exposures >100 m apart and cover <2% of the surface	Rock exposures 30-100 m apart and cover 2-10% of the surface	Rock exposures <30 m apart and cover >10% of the surface	Rock exposures too frequent to permit location of roads and streets

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[1] These guidelines, with some adjustment of slope and rockiness limits, will also be useful for assessing soils for use as parking lots.

[2] Symbols are used to indicate the nature of the limitation.

[3] For an explanation of stoniness, rockiness and soil drainage classes, see the Canada Soil Information System (Canada Soil Survey Committee, 1978).

[4] Rate one class better if the bedrock is soft enough so that it can be dug with light power equipment and is rippable by machinery.

[5] This item estimates the strength of soil materials as it applies to roadbeds. When available, AASHO Group Index values from laboratory tests were used; otherwise, the estimated Unified classes were used. The limitations were estimated assuming that the roads would be surfaced. On unsurfaced roads, rapidly drained, very sandy, poorly graded soils may cause washboard or rough roads.

[6] Group index values were estimated from information published by the Portland Cement Association (PCA, 1962) pp. 23-25.

[7] Downgrade to moderate if content of fines (less than 200 mesh) is greater than about 30 percent.

[8] P.I. means plasticity index.

[9] Frost heave is important where frost penetrates below the paved or hardened surface layer and moisture transportable by capillary movement is sufficient to form ice lenses at the freezing point. The susceptibility classes are taken from the United States Army Corps of Engineers (1962) pp. 5-8.

TABLE 16

Guide for assessing soil suitability for trench-type sanitary landfills

The trench-type sanitary landfill is a sanitary landfill, in which dry garbage and trash is buried daily in an open trench and covered with a layer of soil material. Suitability of the site is dependent upon the potential for pollution of water sources through groundwater contact with the refuse, or leachate arising from the site. Those properties affecting ease of excavation of the site must be supplemented with geological and hydrological knowledge to provide subsurface soil and groundwater data to a depth of at least 3 to 4.5 m, a common depth of landfills.

Symbol[2]	Items Affecting Use	Degree of Soil Suitability			
		Good - G[3]	Fair - F	Poor - P	Very Poor - V
h	Depth to Seasonal High Water Table	Not class determining if more than 180 cm		100-180 cm	<100 cm
w	Wetness[4]	Not class determining if better than imperfectly drained		Imperfectly drained	Poorly and very poorly drained or permanently wet soils
i	Flooding	None	Rare	Occasional	Frequent
k	Permeability[5]	<5 cm/hr	<5 cm/hr	5-15 cm/hr	>15 cm/hr
t	Slope	0-15%	15-30%	30-45%	>45%
s	Soil Texture[4],[6] (dominant to a depth of 150 cm)	SL, L, SiL, SCL	SiCL[7], CL, SC, LS	SiC, C	Muck, peat, gravel, sand
d	Depth to Hard Bedrock Rippable	>150 cm >150 cm	>150 cm 100-150 cm	100-150 cm 100-150 cm	<100 cm <100 cm
p	Stoniness[4]	Stones >10 m apart (Class 0 and 1)	Stones 2-10 m apart (Class 2)	Stones 0.1-2 m apart (Class 3 and 4)	Stones <0.1 m apart (Class 5)
r	Nature of Bedrock	Impermeable			Highly permeable, fractured, easily soluble

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[1] Based on soil depth (120 cm) commonly investigated in making soil surveys.

[2] The symbols are used to indicate the nature of the limitation.

[3] If probability is high that the soil material to a depth of 3 to 4.5 m will not alter a rating of good or fair, indicate this by an appropriate footnote, such as "Probably good to a depth of 3.5 m", or "Probably fair to a depth of 3.5 m".

[4] For an explanation of stoniness, texture and soil drainage classes, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[5] Reflects ability of soil to retard movement of leachate from the landfills; may not reflect a limitation in arid and semiarid areas.

[6] Reflects ease of digging and moving (workability) and trafficability in the immediate area of the trench where there may not be surfaced roads.

[7] Soils high in expansive clays may need to be given a suitability rating of poor.

TABLE 17

Guide for assessing soil suitability for area-type landfills

In the area-type sanitary landfill refuse is placed on the surface of the soil in successive layers. The daily and final cover material generally must be imported. A final cover of soil material at least 60 cm thick is placed over the fill when it is completed. The soil under the proposed site should be investigated so as to determine the probability that leachates from the landfill can penetrate the soil and thereby pollute water supplies.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
h	Depth to Seasonal Water Table[2]	> 150 cm	150-100 cm	50-100 cm	<50 cm
w	Wetness[2],[3]	Rapid to moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained or permanently wet soils
i	Flooding	None	Rare	Occasional	Frequent
k	Permeability[4],[5]	Not class determining if less than 5 cm/hr		5-15 cm/hr	>15 cm/hr
t	Slope	0-9%	9-15%	15-30%	>30%

[1] The symbols are used to indicate the nature of the limitation.

[2] Reflects influence of wetness on operation of equipment.

[3] For an explanation of drainage, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[4] Reflects ability of the soil to retard movement of leachate from landfills; may not reflect a limitation in arid and semiarid areas.

[5] Due to possible groundwater contamination, impermeable bedrock is considered poor and permeable bedrock is rated very poor for area-type sanitary landfills.

TABLE 18

Guide for assessing soil suitability as cover material for area-type sanitary landfills

The term cover material includes soil materials used to put a daily and final covering layer on refuse in area-type sanitary landfills. This cover material may be derived from the area of the landfill or may be brought in from surrounding areas.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
u	Moist Consistence[2]	Very friable, friable	Loose, firm	Very firm	Cemented
s	Texture[2],[3]	SL, L, SiL, SCL	SiCL, CL, SC, LS	SiC, C	Muck, peat, sand, gravel
d	Depth to bedrock[4]	>150 cm	100-150 cm	50-100 cm	<50 cm
c	Coarse fragments[2]	<15%	15-35%	>35%	
p	Stoniness[2]	Stones >10 m apart (Class 0 and 1)	Stones 2-10 m apart (Class 2)	Stones 0.1-2 m apart (Class 3 and 4)	Stones <0.1 m apart (Class 5)
t	Slope	<9%	9-15%	15-30%	>30%
w	Wetness[2]	Not class determining if better than poorly drained		Poorly drained	Very poorly drained or permanently wet soils

[1] The symbols are used to indicate the nature of the limitation.

[2] For an explanation of consistence, texture, coarse fragments, stoniness and soil drainage classes, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[3] Soils having a high proportion of non-expansive clays may be given a suitability rating one class better than is shown for them in this table.

[4] Thickness of material excluding topsoil, which will be stockpiled (see guide for topsoil).

TABLE 19

Guide for assessing soil suitability for reservoirs and sewage lagoons

Factors affecting the ability of undisturbed soils to impound water or sewage and prevent seepage are considered for evaluating soils on their suitability for reservoir and lagoon areas. This evaluation considers soil both as a vessel for the impounded area and as material for the enclosing embankment. As the impounded liquids could be potential sources of contamination of nearby water supplies, e.g. sewage lagoons, the landscape position of the reservoir as it affects risk of flooding must also be considered.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
h	Depth to Water Table[2]	>150 cm	100-150 cm	50-100 cm	<50 cm
i	Flooding[3]	None	None	Subject to infrequent flooding (once in 50 years)	Subject to frequent high level flooding
k	Soil Permeability	0-0.5 cm/hr	0.5-5 cm/hr	5-15 cm/hr	>15 cm/hr
t	Slope	0-2%	2-5%	5-9%	>9%
o	Organic Matter	<2%	2-10%	10-30%	>30%
c	Coarse Fragments[4] <25 cm in diameter, % by volume	<20%	20-35%	>35%	
p	Stoniness[4], >25 cm diameter, percent of surface area	<3% (Class 0, 1 and 2)	3-15% (Class 3)	15-50% (Class 4)	>50% (Class 5)
d	Depth to Bedrock[5]	>150 cm	100-150 cm	50-100 cm	<50 cm
j	Thickness of Slowly Permeable Layer	>100 cm	50-100 cm	50-25 cm	<25 cm
s	Subgrade Unified Soil Classes	GC, SC, CL, & CH	GM, ML, SM & MH	SW & SP	OL, OH & Pt GP, GW

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[1] The symbols are used to indicate the nature of the limitation.

[2] If the floor of the lagoon has nearly impermeable material at least 50 cm thick, disregard depth to water table.

[3] Disregard flooding if it is not likely to enter or damage the lagoon (flood waters have low velocity and depth less than 150 cm).

[4] For an explanation of coarse fragments and stoniness classes, see the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[5] Surface exposures of non rippable rock are rated very poor. If underlying bedrock is impermeable, rating should be one class better.

TABLE 20

Guide for assessing soil suitability for septic tank absorption fields

This guide applies to soils to be used as an absorption and filtering medium for effluent from septic tank systems. A subsurface tile system laid in such a way that effluent from the septic tank is distributed reasonably uniformly into the natural soil is assumed when applying this guide. A rating of poor need not mean that a septic system should not be installed in the given soil, but rather, may suggest the difficulty, in terms of installation and maintenance, which can be expected.

Symbol1/	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
k	Permeability2/	Rapid to moderately rapid	Moderate	Slow	Very slow
	Percolation Rate3/ (Auger hole method)	About 8-18 min/cm3/	18-24 min/cm	Slower than 24 min/cm	
h	Depth to Seasonal Water Table4/	>150 cm5/	100-150 cm	50-100 cm	<50 cm
i	Flooding	Not subject to flooding	Not subject to flooding	Subject to occasional flooding (once in 5 years)	Floods every year
t	Slope	0-9%	9-15%	15-30%	>30%
d	Depth to Hard Rock, bedrock or other impervious materials	>150 cm	100-150 cm6/	50-100 cm	<50 cm

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1/ The symbols are used to indicate the nature of the limitation.

2/ The suitability ratings should be related to the permeability of soil layers at and below depth of the tile line.

3/ Soils having a percolation rate less than about 8 min/cm are likely to present a pollution hazard to adjacent waters. This hazard must be noted, but the degree of hazard must, in each case, be assessed by examining the proximity of the proposed installation to water bodies, water table, and related features. The symbol g is used to indicate this condition. Refer to U.S. Dept. of Health, Education and Welfare (1969) for details of this procedure.

4/ Seasonal means for more than one month. It may, with caution, be possible to make some adjustment for the severity of a water table limitation in those cases where seasonal use of the facility does not coincide with the period of high water table.

5/ A seasonal water table should be at least 100 cm below the bottom of the trench at all times for soils rated Good (U.S. Dept. of Health, Education and Welfare, 1969). The depths used to water table are based on an assumed tile depth of 50 cm. Where relief permits, the effective depth above a water table or rock can be increased by adding appropriate amounts of fill.

6/ Where the slope is greater than 9%, a depth to bedrock of 100-150 cm is assessed as poor.

TABLE 21

Guide for assessing soil suitability for playgrounds

This guide applies to soils to be used intensively for playgrounds for baseball, football, badminton, and for other similar organized games. These areas are subject to intensive foot traffic. A nearly level surface, good drainage, and a soil texture and consistence that gives a firm surface generally are required. The most desirable soils are free of rock outcrops and coarse fragments.

Soil suitability for growing and maintaining vegetation is not a part of this guide, except as influenced by moisture, but is an important item to consider in the final evaluation of site.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
w	Wetness[2]	Rapidly, well and moderately well drained soils with no ponding or seepage. Water table below 75 cm during season of use.	Moderately well drained soils subject to occasional seepage or ponding of short duration and imperfectly drained soils. Water table below 50 cm during season of use.	Imperfectly drained soils subject to seepage or ponding, and poorly drained soils. Water table above 50 cm during season of use.	Very poorly drained and permanently wet soils.
i	Flooding	None during season of use.	Occasional flooding. May flood once every 2-3 years during season of use.	Floods every year during season of use.	Prolonged flooding during season of use.
k	Permeability	Very rapid to moderate.	Moderately slow and slow.	Very slow.	
t	Slope	0-2%	2-5%	5-9%	>9%
d	Depth to Bedrock	>100 cm	50-100 cm[3]	<50 cm[3]	
c	Coarse fragments on surface[2]	Relatively free of coarse fragments.	<20% coarse fragments.	>20% coarse fragments.	
p	Stoniness[2]	Stones >10 m apart. (Class 0 to 1)	Stones 2-10 m apart. (Class 2)	Stones 0.1-2 m apart. (Class 3, 4)	Stones <0.1 m apart. (Class 5)
r	Rockiness[2]	Rock exposures >100 m apart and cover <2% of the surface.	Rock exposures 30-100 m apart and cover about 2-10% of the surface.	Rock exposures <30 m apart and cover >10% of the surface.	Rock outcrops too frequent to permit playground location.
s	Surface Soil Texture[2],[4]	SL, FSL, VFSL, L	SiL, CL, SCL, SiCL, LS	SC, SiC, C[5]; S, Si	Peaty soils; S and LS subject to blowing.
q	Depth to Sand or Gravel[6]	>100 cm	50-100 cm	<50 cm	
m	Useful Moisture[7]	Water storage capacity[8] >15.0 cm and/or adequate rainfall and/or low evapotranspiration.	Water storage capacity[8] 7.5-15 cm and/or moderate rainfall and/or moderate evapotranspiration.	Water storage capacity[8] <7.5 cm and/or low rainfall and/or high evapotranspiration.	

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[1] The symbols are used to indicate the nature of the limitation.

[2] See also definitions for coarse fragments, rockiness, stoniness, textural and soil drainage classes in the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978). Coarse fragments for the purpose of this table include gravels and cobbles.

[3] Downgrade to a very poor suitability rating if the slope is greater than 5%.

[4] Surface soil texture influences soil ratings as it affects foot trafficability, surface wetness, dust, and maintenance. Adverse soil textures may be partially or completely overcome with the addition of topsoil.

[5] Moderately well and well drained SC, SiC and C soils may be rated fair.

[6] Depth to sand or gravel is considered a limitation in that levelling operations may expose sand or gravel, thereby bringing about adverse surface textures and undesirable amounts of coarse fragments. The addition of topsoil after the levelling process would overcome this limitation.

[7] This item attempts to evaluate the adequacy of moisture for vegetative growth. It incorporates the concept of supply through rainfall, loss through evapotranspiration, and storage within the rooting zone. In soils where the water table is within rooting depth for a significant portion of the year, water storage capacity may not significantly influence vegetation growth.

[8] Consult glossary for definitions of terms used.

TABLE 22

Guide for assessing soil suitability for picnic areas

This guide applies to soils considered for intensive use as park-type picnic areas. It is assumed that most vehicular traffic will be confined to the access roads. Soil suitability for growing and maintaining vegetation is not a part of this guide, except as influenced by moisture, but is an important item to consider in the final evaluation of site.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
w	Wetness[2]	Very rapidly, rapidly, well and moderately well drained soils not subject to seepage or ponding. Water table below 50 cm during season of use.	Moderately well drained soils subject to occasional seepage or ponding and imperfectly drained soils not subject to ponding or seepage. Water Table above 50 cm for short periods during season of use.	Imperfectly drained soils subject to seepage or ponding. Poorly drained soils. Water table above 50 cm and often near surface for a month or more during season of use.	Very poorly drained and permanently wet soils.
i	Flooding	None during season of use.	May flood 1 or 2 times per year for short periods during season of use.	Floods more than 2 times during season of use.	Prolonged flooding during season of use.
t	Slope	0-9%	9-15%	15-30%	>30%
s	Surface Soil Texture[2],[3]	SL, FSL, VFSL, L	SiL, CL, SCL, SiCL, LS, and sand other than loose sand.	SC, SiC, C[4]; Si	Peaty soils; loose sand subject to blowing.
c	Coarse Fragments on Surface[2]	0-20%	20-50%	>50%	
p	Stoniness[2]	Stones >2 m apart (Class 0 to 2)	Stones 1-2 m apart (Class 3)	Stones 0.1-1 m apart (Class 4)	Stones <0.1 m apart (Class 5)
r	Rockiness[2],[5],[6]	Rock exposures roughly 30-100 or more m apart and cover <10% of the surface.	Rock exposures roughly 10-30 m apart and cover 10-25% of the surface.	Rock exposures <10 m apart and cover >25% of the surface.	Rock exposures too frequent to permit location of picnic areas.
m	Useful Moisture[7]	Water storage capacity[8] >15 cm and/or adequate rainfall and/or low evapotranspiration.	Water storage capacity[8] 7.5-15 cm and/or moderate rainfall and/or moderate evapotranspiration.	Water storage capacity[8] <7.5 cm and/or low rainfall and/or high evapotranspiration.	

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[1] The symbols are used to indicate the nature of the limitation.

[2] See also definitions for coarse fragments, rockiness, stoniness, textural and soil drainage classes in the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978). Coarse fragments for the purpose of this table, include gravels and cobbles. Some gravelly soils may be rated as having a slight limitation if the content of gravel exceeds 20% by only a small margin providing (a) the gravel is embedded in the soil matrix, or (b) the fragments are less than 2 cm in size.

[3] Surface soil texture influences soil ratings as it affects foot trafficability, dust and soil permeability.

[4] Moderately well and well drained SC, SiC and C soils may be rated fair.

[5] Very shallow soils are rated as having severe or very severe limitations for stoniness or rockiness.

[6] The nature and topography of the bedrock exposures may significantly alter these ratings. As such, on-site investigations will be necessary in map units containing bedrock when these are considered as possible sites.

[7] This item attempts to evaluate the adequacy of moisture for vegetative growth. It incorporates the concept of supply through rainfall, loss through evapotranspiration, and storage within the rooting zone. In soils where the water table is within rooting depth for a significant portion of the year, water storage capacity may not significantly influence vegetation growth.

[8] Consult glossary for definitions of terms used.

TABLE 23

Guide for assessing soil suitability for camp areas

This guide applies to soils to be used intensively for tents and camp trailers and the accompanying activities of outdoor living. It is assumed that little site preparation will be done other than shaping and levelling for campsites and parking areas. The soil should be suitable for heavy foot traffic by humans and limited vehicular traffic. Soil suitability for growing and maintaining vegetation is not a part of this guide, but is an important item to consider in the final evaluation of site.

Back country campsites differ in design, setting and management but require similar soil attributes. These guides should apply to evaluations for back country campsites but depending on the nature of the facility the interpreter may wish to adjust the criteria defining a given degree of limitation to reflect the changed requirement. For example, small tentsites may allow rock exposures greater than 10 m apart to be considered a slight limitation.

Symbol[1]	Items Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
w	Wetness[2]	Very rapidly, rapidly, well and moderately well drained soils with no seepage or ponding. Water table below 75 cm during season of use.	Moderately well drained soils subject to occasional seepage or ponding and imperfectly drained soils with no seepage or ponding. Water table below 50 cm during season of use.	Imperfectly drained soils subject to seepage or ponding and poorly drained soils. Water table above 50 cm during season of use.	Very poorly drained and permanently wet soils.
i	Flooding	None	Very occasional flooding during season of use. Once in 5-10 years.	Occasional flooding during season of use. Once in 2-4 years.	Flooding during every season of use.
k	Permeability	Very rapid to moderate inclusive.	Moderately slow and slow.	Very slow.	
t	Slope	0-9%	9-15%	15-30%	>30%
s	Surface Soil Texture[2,3]	SL, FSL, VFSL, L	SiL, SCL, CL, SiCL, LS, and sand other than loose sand.	SC, SiC, C[4]; Si	Peaty soils; loose sand subject to blowing.
c	Coarse Fragments on Surface[2,5]	0-20%	20-50%	>50%	
p	Stoniness[2,6]	Stones >10 m apart (Class 0 and 1)	Stones 2-10 m apart (Class 2)	Stones 0.1-2 m apart (Class 3 and 4)	Stones < 0.1 m apart (Class 5)
r	Rockiness[2,6]	No rock exposures	Rock exposures >10 m apart and cover < 25% of the area.	Rock exposures <10 m apart and cover >25% of the area.	Rock exposures too frequent to permit campground location.

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[1] The symbols are used to indicate the nature of the limitation.

[2] See also definitions for coarse fragments, rockiness, stoniness, textural and soil drainage classes in the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[3] Surface soil texture influences soil ratings as it affects foot trafficability, dust, and soil permeability.

[4] Moderately well and well drained SC, SiC and C soils may be rated fair.

[5] Coarse fragments for the purpose of this table include gravels and cobbles. Some gravelly soils may be rated as having slight limitations if the content of gravel exceeds 20% by only a small margin, providing (a) the gravel is embedded in the soil matrix, or (b) the fragments are less than 2 cm in size.

[6] Very shallow soils are rated as having a limitation for rockiness and/or stoniness.

TABLE 24

Guide for assessing soil suitability for paths and trails

It is assumed that the trails will be built at least 45 cm wide and that obstructions such as cobbles and stones will be removed during construction. It is also assumed that a dry, stable tread is desirable and that muddy, dusty, worn or eroded trail treads are undesirable. Hiking and riding trails are not treated separately, but as the design requirements for riding trails are more stringent, a given limitation will be more difficult to overcome. Poor or very poor suitability does not indicate that a trail cannot or should not be built. It does, however, suggest higher design requirements and maintenance to overcome the limitations.

Symbol[1]	Items[2] Affecting Use	Degree of Soil Suitability			
		Good - G	Fair - F	Poor - P	Very Poor - V
s	Texture[3],[4]	SL, FSL, VFSL, LS, L	SiL, CL, SiCL, SCL	SC, SiC, C[5]; Sand, Si	Peaty soils; loose sand subject to blowing
c	Coarse Fragment Content[4],[6]	0-20%	20-50%	>50%	
p	Stoniness[4]	Stones >2 m apart (Class 0 to 2)	Stones 1-2 m apart (Class 3)	Stones 0.1-1 m apart (Class 4)	Stones <0.1 m apart (Class 5)
w	Wetness[4]	Very rapidly, rapidly well, and moderately well drained soils. Water table below 50 cm during season of use.	Moderately well drained soils subject to occasional seepage and ponding and imperfectly drained soils. Water table may be above 50 cm for short periods during season of use.	Poorly and very poorly drained soils. Water table above 50 cm and often near surface for a month or more during season of use.	Permanently wet soils.
r	Rockiness[4],[7]	Rock exposures >30 m apart and cover <10% of the surface.	Rock exposures 10-30 m apart and cover 10-25% of the surface.	Rock exposures <10 m apart and cover >25% of the surface.	Rock exposures too frequent to permit location of paths and trails.
t	Slope[8]	0-15%	15-30%	30-60%	>60%
i	Flooding	Not subject to flooding during season of use.	Floods 1 or 2 times during season of use.	Floods more than 2 times during season of use.	Subject to prolonged flooding during season of use.

[1] The symbols are used to indicate the nature of the limitation.

[2] The items affecting use listed in this table are those which have been shown to cause significant differences in trail response. Elevation, aspect, position on slope, and snow avalanching may have slight affects or influence trail management and should be considered in the final site evaluation. Items such as vegetation, fauna, and scenic value are not considered in the guidelines (Epp, 1977).

[3] Texture refers to the soil texture which will form the tread texture. This is the surface texture on level areas but may be a subsurface texture on slopes. Textural classes are based on the less than 2 mm soil fraction. Texture influences soil ratings as it influences foot trafficability, dust, design or maintenance of trails, and erosion hazards.

[4] See also definitions for coarse fragments, rockiness, stoniness, textural and soil drainage classes in the Manual for Describing Soils in the Field (Canada Soil Survey Committee, 1978).

[5] Moderately well and well drained SC, SiC and C soils may be rated fair.

[6] Coarse fragments for the purpose of this table, include gravels and cobbles. Gravels tend to cause unstable footing when present in high amounts, and are also associated with increased erosion. Cobbles (and stones) must be removed from the trail tread, increasing construction and maintenance difficulties. Some gravelly soils may be rated as having a slight limitation if the content of gravel exceeds 20% by only a small margin providing (a) the gravel is embedded in the soil matrix or (b) the fragments are less than 2 cm in size.

[7] The type of rock outcrop (flat lying vs cliffs), and the orientation of the structure (linear cliffs vs massive blocks) can greatly alter the degree of the limitation. Each site with a Rockiness limitation based on the percent rock outcrop above should be evaluated on its own merits and the degree of limitation should then be modified appropriately if necessary.

[8] Slope in this context refers to the slope of the ground surface, not the slope of the tread.

Appendix F

MORPHOLOGICAL AND ANALYTICAL DATA FOR SEVERAL SOILS IN THE MAP AREA

JUL 25, 1984

DVD MANITOBA 1983 PROFILE NO. 24

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; DEVIATION(S): SOLUM THICKNESS; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ORTHIC DARK GRAY. MINERAL SOIL FAMILY: SANDY, MIXED NONCLAY, ALKALINE, STRONGLY CALCAREOUS, COLD, SUBHUMID. SOIL MAP UNIT: NOTATION: DVD, ASSOCIATED SOILS: LRYAND WOG.

LOCATION: MILITARY GRID REF. 14 UPK 8132 7860; NTS MAP AREA 62H ; SE 31 5 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 12 DEG(C) AT 20 CM IN JUNE, NO. 2 WAS 11 DEG(C) AT 50 CM IN JUNE, NO. 3 WAS 8 DEG(C) AT 100 CM IN JUNE.

VEGETATION: KEY SPECIES LISTING: 1 QUERCUS - OAK, 2 CORYLUS AMERICANA - AMERICAN HAZEL, 3 AMELANCHIER - JUNEBERRY OR SHADBUSH. BEARBERRY,HOARY PUCOON, MEADOW RHUE, GRASSES, ANTENARIA.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, RIDGED; SLOPE: 2% SIMPLE SLOPE OF CLASS 2 (0.5-2%), FACING SOUTHEAST, SITE AT MIDDLE POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, WELL DRAINED, RAPIDLY PERVIOUS, MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; NONROCKY; PRESENT LAND USE: NATURAL GRAZING.

SPECIAL NOTES: ON THE BEACH RIDGE RAN INTO DARK GRAY,DARK GRAY LUVISOL AND GRAY LUVISOL PROFILES ON SAND AND GRAVEL. PART OF RIDGE IN CEREALS, AND HAY.

LH: 1 TO 0 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1; ORGANIC; NONPLASTIC CONSISTENCE; PLENTIFUL, MICRO AND VERY FINE, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

AH: 0 TO 10 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 3.5/1; LOAMY SAND; MEDIUM, SUBANGULAR BLOCKY SECONDARY STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; PLENTIFUL, MICRO AND VERY FINE, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

BM1: 10 TO 35 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/2, MATRIX DRY 10YR 4/1; LOAMY SAND; WEAK, MEDIUM, COLUMNAR STRUCTURE; VERY WEAK SECONDARY STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; FEW, MICRO AND VERY FINE, VERTICAL AND HORIZONTAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

BM2: 35 TO 55 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/3, MATRIX DRY 10YR 5/4; SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; FEW, MICRO, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

CK1: 55 TO 100 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/3, MATRIX DRY 10YR 7/3; GRITTY SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE ROOTS; WEAK EFFERVESCENCE; STRONGLY CALCAREOUS.

CK2: 100 TO 120 CM; HORIZON MOIST; MATRIX MOIST 10YR 5.5/3, MATRIX DRY 10YR 7/3; GRITTY SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL AND HORIZONTAL ROOTS; WEAK EFFERVESCENCE; STRONGLY CALCAREOUS.

JUL 25, 1984

DVD MANITOBA 1983 PROFILE NO. 24

CHEMICAL DATA (SURVEY)

								C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	BUFF.	PERM. CHARG	CA	MG	NA	K
LH	7.1	7.90	0.26				4.0	24.4		17.9	3.2	0.1	1.0
AH	6.5	2.40	0.14				3.2	16.5		11.0	2.5	0.1	0.1
BM1	6.4	0.78	0.05				2.2	8.7		4.7	1.3	0.1	0.1
BM2	7.1	0.25	0.02	3.3	0.5	2.6		3.5		4.5	0.6		
CK1	7.7			15.0	5.1	9.2		1.1		4.9	0.3		
CK2	7.7			11.8	3.1	8.0		1.1		4.6	0.2		

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AH	0.1	40.9
BM1	0.1	28.1
BM2	0.2	27.3
CK1	0.1	28.0
CK2	0.1	30.1

PHYSICAL DATA (SURVEY)

	PARTICLE SIZE ANALYSIS													
	% PASSING				% OF SAMPLE									
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AH					1	10	44	28	3	86		8	6	
BM1				99	1	9	42	33	3	88		6	6	
BM2			98	95	2	9	47	33	3	94		3	3	
CK1			97	96	2	12	51	31	1	97		2	1	
CK2				98	1	8	43	45	2	99			1	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AH								
BM1								
BM2								
CK1								
CK2							30	06

DEC 18, 1981

IWO MANITOBA 1980 PROFILE NO. 8

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; EXTENSIVE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED DARK GRAY. MINERAL SOIL FAMILY: LOAMY, CARBONATIC, COOL, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: IWO, ASSOCIATED SOILS:MEB AND PLN. SOIL PHASES: MODERATELY STONY.

LOCATION: MILITARY GRID REF. 14 UPK 7628 5058; NTS MAP AREA 62H ; SE 4 3 7 E.

VEGETATION: FOREST,HARDWOOD. KEY SPECIES LISTING: 1 POPULUS TREMULOIDES - TREMBLING ASPEN. SOLIDAGO, THALITRICUM,JUNE GRASS, SMALL OAKS.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SKELETAL (>35% OF PARTICLES 2-25 CM) AND SANDY, WEAKLY CALCAREOUS (1 TO 6% CACO3), GLACIOLACUSTRINE, MIXED; PARENT MATERIAL 2: WEAK CHEMICAL WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), MORAINAL (TILL), MIXED; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%); SOIL MOISTURE AND DRAINAGE: HUMID, IMPERFECTLY DRAINED, SLOW AND VERY SLOW SURFACE RUNOFF, SEEPAGE ABSENT; MODERATELY STONY; PRESENT LAND USE: UNPRODUCTIVE WOODLAND.

INTERPRETATIONS: CLI AGRICULTURE 4/P.

SPECIAL NOTES: AREA BURNT OVER THIS SPRING.

AHE: 0 TO 6 CM; HORIZON DRY; MATRIX MOIST 10YR 2.5/1, MATRIX DRY 10YR 3.5/1; SANDY LOAM; VERY WEAK, FINE, GRANULAR STRUCTURE; FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; SMOOTH, CLEAR HORIZON BOUNDARY.

BMGJ: 6 TO 22 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 3/2, MATRIX DRY 2.5Y 5.5/2; SANDY LOAM; WEAK TO MODERATE, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; LOOSE, PLASTIC CONSISTENCE; WAVY, GRADUAL HORIZON BOUNDARY.

CKG1:   22 TO 40 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 6/2, MATRIX DRY 10YR 8/1; LOAM; FEW, FINE, FAINT MOTTLES; WEAK, FINE, GRANULAR STRUCTURE; FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; SMOOTH, CLEAR HORIZON BOUNDARY.

CKG2:   40 TO 90 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 8/2; LOAM; COMMON, MEDIUM, DISTINCT, 10YR 6/8 MOTTLES; WEAK, FINE, PLATY STRUCTURE PSEUDO; FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; VERY STRONGLY CALCAREOUS.

CKG3:   90 TO 120 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 8/2; LOAM; COMMON, MEDIUM, DISTINCT, 10YR 6/8 MOTTLES; MODERATE, FINE TO MEDIUM, PLATY STRUCTURE PSEUDO; FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; VERY STRONGLY CALCAREOUS.

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL- CITE (%)	DOLO- MITE (%)	EXTR ACID	C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
								BUFF.	PERM. CHARG	CA	MG	NA	K
AHE	7.1	8.13	0.49				0.8	42.5		30.3	11.5	0.1	0.3
BMGJ	7.6	0.80	0.08	3.4	0.0	3.2	0.2	19.1		16.9	7.7	0.1	0.3
CKG1	8.0			38.5	17.3	19.5		5.7		21.6	4.6	0.1	0.1
CKG2	8.0			40.2	17.4	21.1		5.3		20.1	4.8	0.1	0.1
CKG3	8.0			35.4	12.1	21.5		4.9		18.9	3.8	0.1	0.1

IMD MANITOBA 1980 PROFILE NO. 8

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
AHE	0.5	70.0
BMGJ	0.5	40.0
CKG1	0.4	29.0
CKG2	0.4	24.0
CKG3	0.5	26.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING				% OF SAMPLE									
HORIZON	3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AHE					5	7	15	17	12	56		24	20	
BMGJ					5	9	20	20	11	65		18	17	
CKG1					6	5	8	16	18	53		30	17	
CKG2					5	5	8	17	15	50		36	14	
CKG3					3	4	7	21	18	53		34	13	

PHYSICAL DATA

	SURVEY (CON'T)					ENGINEERING								
	MOISTURE STATUS (%)													
HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
AHE	50.9	39.7	19.0										
BMGJ	27.2	20.1	9.2										
CKG1													
CKG2	21.4	17.2	7.2										
CKG3						12.0	17.0	14.5				40	19

JUS MANITOBA 1981 PROFILE NO. 64

NOV 08, 1984

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; VERY LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: TYPIC FIBRISOL. ORGANIC SOIL FAMILY: SPHAGNIC, DYSIC, COOL, SUBAQUIC, LOAMY. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: JUS, ASSOCIATED SOILS: STDAND KIC.

LOCATION: MILITARY GRID REF. 14 UPK 8000 9571; NTS MAP AREA 62H ; SE 25 7 7 E.

VEGETATION: FOREST,SOFTWOOD, UNDISTURBED. KEY SPECIES LISTING: 1 PICEA MARIANA - BLACK SPRUCE, 2 LEDUM GROENLANDICUM - LABRADOR TEA, 3 CHAMAEDAPHNE PETIT-DAPHNE - LEATHER-LEAF.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), ORGANIC, SPHAGNUM PEAT; PARENT MATERIAL 2: CHEMICAL AND PHYSICAL WEATHERING, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), ORGANIC, A930; PARENT MATERIAL 3: WEAK CHEMICAL WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE; ORGANIC DEPOSIT IS 2.5 M; LANDFORM CLASSIFICATION: BOG, FIBRIC, DOMED; SLOPE: MODERATELY MOUNDED MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBAQUIC, VERY POORLY DRAINED, RAPIDLY PERVIOUS, VERY SLOW SURFACE RUNOFF, SEEPAGE PRESENT, 0.4 M TO APPARENT WATERTABLE; NONSTONY; NONROCKY; PRESENT LAND USE: BOG.

SPECIAL NOTES: EAST SIDE OF PLATEAU HAS BEEN BURNED

OF1: 0 TO 20 CM; HORIZON WET; MATRIX MOIST 5YR 4/4, MATRIX DRY 7.5YR 7/2; MATERIAL COMPOSITION 10 AND 10 AND 70 AND 10% HERBACEOUS FRAGMENTS AND NEEDLES AND SPHAGNUM AND FEATHERMOSS, NO DECOMPOSITION; <10% BY VOLUME; NONSTICKY CONSISTENCE; WAVY, GRADUAL HORIZON BOUNDARY; EXTREMELY ACID <4.5 FIELD PH.

OF2: 20 TO 100 CM; HORIZON WET; MATRIX MOIST 5YR 4/4, MATRIX DRY 7.5YR 7/2; MATERIAL COMPOSITION 10 AND 10 AND 70 AND 10% HERBACEOUS FRAGMENTS AND NEEDLES AND SPHAGNUM AND FEATHERMOSS, NO DECOMPOSITION; <10% BY VOLUME; NONSTICKY CONSISTENCE; WAVY, GRADUAL HORIZON BOUNDARY; EXTREMELY ACID <4.5 FIELD PH.

OF3: 100 TO 150 CM; HORIZON WET; MATRIX MOIST 5YR 3/3, MATRIX DRY 7.5YR 6/4; MATERIAL COMPOSITION 10 AND 10 AND 70 AND 10% HERBACEOUS FRAGMENTS AND NEEDLES AND SPHAGNUM AND FEATHERMOSS, NO DECOMPOSITION; NONSTICKY CONSISTENCE; WAVY, GRADUAL HORIZON BOUNDARY; EXTREMELY ACID <4.5 FIELD PH.

2OM1: 150 TO 250 CM; HORIZON WET; MATRIX MOIST 5YR 3/2, MATRIX DRY 5YR 4/3; MATERIAL COMPOSITION 10 AND 10 AND 80% HERBACEOUS FRAGMENTS AND FEATHERMOSS AND SEDGE AND REED, MODERATE DECOMPOSITION; SLIGHTLY STICKY CONSISTENCE; SMOOTH, ABRUPT HORIZON BOUNDARY; VERY STRONGLY ACID 4.6-5.0 FIELD PH.

3CKG: 250 TO 270 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 3.5/0; FINE SANDY LOAM; STICKY CONSISTENCE; MODERATE EFFERVESCENCE; VERY STRONGLY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

JUS MANITOBA 1981 PROFILE NO. 64

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	PYRO EXTR C-%	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
OF1	3.3	43.41	30.2	1.06				99.9	112.7		10.5	3.1	0.2	1.9
OF2	3.2	56.05	7.0	0.52				99.9	138.2		14.4	7.6	0.2	0.4
OF3	3.3	58.02	12.6	0.74				99.9	129.7		18.1	8.2	0.5	0.3
2OM1	4.7	62.27	16.0	1.30				64.9	117.9		37.6	15.0	0.4	0.2
3CKG	7.5				26.5	12.3	13.1		14.1		31.9	5.8	0.2	0.4

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
OF1	0.7	42.1
OF2		
OF3		
2OM1		
3CKG		

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	RUB FIB %	UNRUB FIBRE %	% ASH	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
OF1	92	99	27														
OF2	84	88	3														
OF3	54	78	4														
2OM1	50	58	5														
3CKG								1	2	18	26	16	63		18	19	

JUL 25, 1984

LAB MANITOBA 1983 PROFILE NO. 22

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. DEVIATION(S): DRAINAGE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED CUMULIC REGOSOL. MINERAL SOIL FAMILY: SANDY, MIXED NONCLAY, COLD, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: LAB, ASSOCIATED SOILS: MARAND MNT.

LOCATION: MILITARY GRID REF. 14 UPK 8055 8930; NTS MAP AREA 62H ; NW 31 6 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 10 DEG(C) AT 20 CM IN JUNE, NO. 2 WAS 10 DEG(C) AT 50 CM IN JUNE, NO. 3 WAS 8 DEG(C) AT 100 CM IN JUNE.

VEGETATION: FOREST,HARDWOOD. KEY SPECIES LISTING: 1 FRAXINUS - ASH, 2 ULMUS - ELM, 3 ACER RUBRUM - RED MAPLE. SOME DOGWOOD, GRASSES.

SOIL SITE: PARENT MATERIAL 1: SANDY, WEAKLY CALCAREOUS (1 TO 6% CACO3), FLUVIAL, MIXED; LANDFORM CLASSIFICATION: FLUVIAL, SANDY, HUMMOCKY; SLOPE: COMPLEX SLOPE OF CLASS 4 (6-9%), FACING EAST, SITE AT CREST POSITION; SOIL MOISTURE AND DRAINAGE: SUBHUMID, MODERATELY WELL DRAINED, RAPIDLY PERVIOUS, MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; NONROCKY; PRESENT LAND USE: WOODLAND GRAZING.

SPECIAL NOTES: A BIT BETTER DRAINED

CK1: 0 TO 10 CM, RANGE 5 TO 30 CM; HORIZON DRY; MATRIX MOIST 10YR 6/3, MATRIX DRY 10YR 6/3; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS.

CK2: 10 TO 45 CM, RANGE 15 TO 35 CM; HORIZON DRY; MATRIX MOIST 10YR 5/3, MATRIX DRY 10YR 6/3; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS.

AHKB1: 45 TO 65 CM, RANGE 15 TO 20 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/2, MATRIX DRY 10YR 4/1; VERY FINE SANDY LOAM; WEAK, FINE, GRANULAR STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; PLENTIFUL, MICRO AND VERY FINE, VERTICAL AND HORIZONTAL ROOTS.

CKGJ3: 65 TO 85 CM, RANGE 203 TO 0 CM; HORIZON MOIST; MATRIX MOIST 10YR 5.5/3, MATRIX DRY 10YR 6/3; FINE SAND; COMMON, FINE, DISTINCT, 10YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; FEW, MICRO AND VERY FINE, VERTICAL AND HORIZONTAL ROOTS; WEAKLY CALCAREOUS.

AHKB2: 85 TO 100 CM, RANGE 10 TO 15 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 4/4, MATRIX DRY 2.5Y 0.4; LOAMY FINE SAND; COMMON, FINE, DISTINCT MOTTLES; WEAK, FINE, GRANULAR STRUCTURE; LOOSE, SLIGHTLY PLASTIC CONSISTENCE; FEW, MICRO AND VERY FINE, VERTICAL AND HORIZONTAL ROOTS; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS.

CKGJ4: 100 TO 115 CM, RANGE 10 TO 15 CM; HORIZON MOIST; MATRIX MOIST 10YR 5.5/4, MATRIX DRY 2.5Y 6/2; LOAMY FINE SAND; COMMON, FINE, DISTINCT MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO AND VERY FINE, VERTICAL ROOTS; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS.

AKHB3: 115 TO 130 CM, RANGE 5 TO 10 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/3, MATRIX DRY 2.5Y 5/2; FINE SAND; MANY, FINE, DISTINCT MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO AND VERY FINE, VERTICAL ROOTS; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS.

CKGJ5: 130 TO 150 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 2.5Y 6/2; FINE SAND; COMMON, FINE, DISTINCT MOTTLES; 7.5YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS.

JUL 25, 1984

LAB MANITOBA 1983 PROFILE NO. 22

CHEMICAL DATA (SURVEY)

							C.E.C. (ME/100G)		EXCHANGEABLE CATIONS EUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	BUFF.	PERM. CHARG	CA	MG	NA	K
CK1	7.5		0.07	3.2	0.2	2.7	5.9		6.5	0.9		0.1
CK2	7.7			2.5		2.3	6.0		5.1	1.8		0.1
AHKB1	7.7	3.57	0.24	4.6	0.2	4.1	35.5		24.8	6.3	0.1	0.3
CKGJ3	7.8			4.4	0.1	4.0	7.0		6.9	1.7		0.1
AHKB2	7.6	0.65	0.06	6.4		5.9	13.0		11.1	2.9	0.1	0.1
CKGJ4	7.8			4.3	0.6	3.4	7.0		8.9	1.6		0.1
AKHB3	7.7	0.44	0.03	51.8	0.8	4.0	6.4		9.5	1.4		0.1
CKGJ5	7.8			2.5	0.2	2.1	4.0		5.0	0.8		

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
CK1	0.2	34.3
CK2	0.1	36.7
AHKB1	0.2	71.5
CKGJ3	0.1	34.7
AHKB2	0.2	41.8
CKGJ4	0.1	35.1
AKHB3	0.2	36.4
CKGJ5	0.2	28.2

JUL 25, 1984

LAB MANITOBA 1983 PROFILE NO. 22

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING										% OF SAMPLE			
	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
CK1								56	36	92		3	5	
CK2								75	17	92		3	5	
AHKB1								16	44	60		23	17	
CKGJ3								50	39	89		4	7	
AHKB2								42	39	81		8	11	
CKGJ4								49	37	86		6	8	
AKHB3							1	63	27	91		3	6	
CKGJ5							1	60	30	91		3	6	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
CK1								
CK2								
AHKB1								
CKGJ3								
AHKB2								
CKGJ4							24	07
AKHB3								
CKGJ5							24	07

JUL 25, 1984

LAM MANITOBA 1983 PROFILE NO. 15

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; DEVIATION(S): TEXTURE; VERY LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: REGO HUMIC GLEYSOL. MINERAL SOIL FAMILY: CARBONATIC, ALKALINE, EXTREMELY CALCAREOUS, COLD, SUBAQUIC. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: LAM, ASSOCIATED SOILS: MNTAND PPL.

LOCATION: MILITARY GRID REF. 14 UPK 8675 8540; NTS MAP AREA 62H ; SE 22 6 8 E.

VEGETATION: WILLOWS AND GRASSES IN DITCH..

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, FINE LOAMY AND FINE SILTY (18 TO 35% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), LACUSTRINE, MIXED; PARENT MATERIAL 2: WEAK CHEMICAL WEATHERING, SANDY, EXTREMELY CALCAREOUS (>40% CACO3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%), FACING LEVEL, SITE AT DEPRESSION POSITION; SOIL MOISTURE AND DRAINAGE: VERY POORLY DRAINED, MODERATELY PERVIOUS, VERY SLOW SURFACE RUNOFF, SEEPAGE PRESENT; NONSTONY; NONROCKY; PRESENT LAND USE: CROPLAND.

SPECIAL NOTES: BASICALLY A MALONTON SOIL WITH A HEAVIER TEXTURED SURFACE. SOME OF THE MORE DISTINCT MOTTLES WERE FOUND AROUND VERTICAL ROOTS

APK: 0 TO 20 CM; HORIZON MOIST; MATRIX MOIST 10YR 3.5/1, MATRIX DRY 10YR 5/1; SANDY CLAY LOAM; MODERATE, MEDIUM, GRANULAR STRUCTURE; VERY FRIABLE, PLASTIC CONSISTENCE; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY.

CCAG1: 20 TO 40 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/1, MATRIX DRY 2.5Y 7/1; SANDY CLAY LOAM; MODERATE, MEDIUM, PLATY STRUCTURE PSEUDO; FRIABLE, PLASTIC CONSISTENCE; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

CCAG2: 40 TO 60 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 2.5Y 8/1; LOAMY VERY FINE SAND; FEW, FINE, FAINT MOTTLES; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; COMMON, MEDIUM, IRREGULAR IRON-MANGANESE CONCRETIONS LOCATED LOCAL CONCENTRATIONS (5YR 2/1); STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

CKG1: 60 TO 67 CM; HORIZON WET; MATRIX MOIST 10YR 5/8, MATRIX DRY 7.5YR 6/8; LOAMY VERY FINE SAND; MANY, COARSE, PROMINENT, 10YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; SLIGHTLY STICKY, NONPLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

CKG2: 67 TO 120 CM; HORIZON WET; MATRIX MOIST 10YR 6/6, MATRIX DRY 2.5Y 7/4; FINE SAND; MANY, COARSE, PROMINENT, 5YR 4/8 MOTTLES; STRUCTURELESS STRUCTURE; SLIGHTLY STICKY, NONPLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS.

CHEMICAL DATA (SURVEY)

							C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	BUFF.	PERM. CHARG	CA	MG	NA	K
APK	7.7	6.72	0.39	37.4	32.7	4.4	37.1		36.1	6.4	0.2	0.6
CCAG1	7.8			42.3	39.4	3.6	6.1		20.3	2.8	0.1	
CCAG2	7.8			25.3	15.5	9.0	2.1		15.7	1.0	0.1	
CKG1	7.8			16.4	8.7	7.1	3.3		15.8	0.9		
CKG2	7.8			17.0	3.3	12.7	2.9		7.2	0.6		

LAM MANITOBA 1983 PROFILE NO. 15

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
APK	1.3	69.0
CCAG1	0.3	33.3
CCAG2	0.4	28.8
CKG1	0.3	34.6
CKG2	0.2	31.4

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING				% OF SAMPLE									
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
APK							1	12	32	45		24	31	
CCAG1							1	10	45	56		21	23	
CCAG2							1	26	59	86		8	6	
CKG1								8	74	82		10	8	
CKG2						1	3	42	48	94		4	2	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
APK								
CCAG1								
CCAG2								
CKG1							24	07
CKG2							24	07

DEC 19, 1981

LRY MANITOBA 1980 PROFILE NO. 12

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ORTHIC DARK GRAY. MINERAL SOIL FAMILY: SANDY SKELETAL, CARBONATIC, ALKALINE, STRONGLY CALCAREOUS, COOL, SEMIARID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: LRY, ASSOCIATED SOILS: PAN.

LOCATION: MILITARY GRID REF. 14 UFK 8663 6010; NTS MAP AREA 62H ; SE 3 4 8 E.

VEGETATION: FOREST,MIXED, CLEAR-CUT. KEY SPECIES LISTING: 1 PINUS BANKSIANA - JACK PINE. PASTURE SAGE, GRASSES,ROSACEAE, WORMWOOD, BLUEBELLS.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SKELETAL (>35% OF PARTICLES 2-25 CM) AND SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), GLACIOLACUSTRINE, IGNEOUS; LANDFORM CLASSIFICATION: LACUSTRINE, GRAVELLY, RIDGED; SLOPE: 2% SIMPLE SLOPE OF CLASS 2 (0.5-2%), FACING EAST, SITE AT UPPER SLOPE POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: WELL DRAINED, RAPIDLY PERVIOUS, RAPID AND MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; PRESENT LAND USE: MINES,QUARRIES,ETC.

INTERPRETATIONS: CLI AGRICULTURE 5/M.

LH: 1 TO 0 CM; HORIZON DRY; MATRIX DRY 10YR 4/1, NATURAL WET/OXIDIZED 10YR 3/1; STRUCTURELESS STRUCTURE; LOOSE CONSISTENCE; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

AHE: 0 TO 10 CM; HORIZON DRY; MATRIX DRY 10YR 4/1, NATURAL WET/OXIDIZED 10YR 3/1; LOAMY SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; SLIGHTLY POROUS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BM: 10 TO 20 CM; HORIZON DRY; MATRIX DRY 10YR 4/3, NATURAL WET/OXIDIZED 10YR 3/3; GRAVELLY COARSE SAND; WEAK, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; SOFT, SLIGHTLY PLASTIC CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; SLIGHTLY POROUS; SMOOTH, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CK1: 20 TO 60 CM; HORIZON MOIST; MATRIX DRY 10YR 7/3, NATURAL WET/OXIDIZED 10YR 6/4; very gravelly SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; FEW, MICRO, VERTICAL ROOTS; SLIGHTLY POROUS; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; SMOOTH, CLEAR HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CK2: 60 TO 140 CM; HORIZON MOIST; MATRIX DRY 10YR 7/3, NATURAL WET/OXIDIZED 10YR 6/4; GRAVELLY COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; MODERATELY CALCAREOUS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	6.8	26.75	1.20				10.0	37.1		25.0	8.2	0.2	2.0
AHE	7.3	1.26	0.05				1.4	10.9		7.2	1.5	0.1	0.1
BM	7.5	1.08	0.10	12.3	1.2	10.3		7.4		7.2	1.4	0.1	
CK1	7.6			9.7	2.6	6.6		1.3		7.9	0.4		
CK2	7.8			9.1	3.0	5.6		0.9		9.0	0.4		

LRY MANITOBA 1980 PROFILE NO. 12

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AHE	0.3	30.0
BM	0.5	25.0
CK1	0.2	27.0
CK2	0.1	22.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AHE					2	6	37	37	3	85		7	8	
BM				55	28	12	23	21	4	88		9	3	
CK1				82	14	10	39	33	1	98		2	0	
CK2				50	17	10	20	51	1	99		1	0	

PHYSICAL DATA

SURVEY (CON'T)

MOISTURE STATUS (%)

HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST
LH					
AHE	19.4	11.7	4.8		
BM	18.1	10.8	3.5		
CK1	3.5	1.7	1.0		
CK2					

JUL 25, 1984

LRY MANITOBA 1983 PROFILE NO. 14

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ORTHIC DARK GRAY. MINERAL SOIL FAMILY: SANDY SKELETAL, MIXED NONCLAY, ALKALINE, STRONGLY CALCAREOUS, COLD, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: LRY, ASSOCIATED SOILS: WOG.

LOCATION: MILITARY GRID REF. 14 UPK 7505 8980; NTS MAP AREA 62H ; SE 4 7 7 E.

VEGETATION: UNDISTURBED. KEY SPECIES LISTING: 1 QUERCUS MACROCARPA - BUR OAK, 2 L, 3 O. GRASSES.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SKELETAL (>35% OF PARTICLES 2-25 CM), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), GLACIOLACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, BOULDERY, RIDGED; SLOPE: 3% SLOPE OF CLASS 3 (2-5%), FACING LEVEL, SITE AT CREST POSITION, 200 M LONG; SOIL MOISTURE AND DRAINAGE: SUBHUMID, RAPIDLY DRAINED, RAPIDLY PERVIOUS, MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; VERY STONY; PRESENT LAND USE: NATURAL GRAZING.

SPECIAL NOTES: MANY LARGE BOULDERS DISTRIBUTED THROUGHOUT GRAVEL.A PIT HAS FOUND 12 M DEEP WITH NO WATER TABLE.

LH: 1 TO 0 CM; HORIZON MOIST; ORGANIC; WAVY, CLEAR HORIZON BOUNDARY.

AH: 0 TO 10 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 4/1; COARSE SANDY LOAM; STRUCTURELESS STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; PLENTIFUL, MICRO AND VERY FINE AND MEDIUM, VERTICAL AND HORIZONTAL ROOTS; SMOOTH, ABRUPT HORIZON BOUNDARY.

BM: 10 TO 20 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/2, MATRIX DRY 10YR 4/3; LOAMY COARSE SAND; STRUCTURELESS STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; PLENTIFUL, MICRO AND VERY FINE, VERTICAL ROOTS; GRAVELLY COARSE FRAGMENTS; WAVY, GRADUAL HORIZON BOUNDARY.

BC: 20 TO 45 CM; HORIZON MOIST; MATRIX MOIST 10YR 4/4, MATRIX DRY 10YR 5/3; GRAVELLY COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; MICRO AND VERY FINE, VERTICAL ROOTS; STRONGLY CALCAREOUS; GRAVELLY COARSE FRAGMENTS; WAVY, GRADUAL HORIZON BOUNDARY.

CCA: 45 TO 60 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 7/3; GRAVELLY COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; MICRO, VERTICAL ROOTS; VERY STRONGLY CALCAREOUS; GRAVELLY COARSE FRAGMENTS; WAVY, GRADUAL HORIZON BOUNDARY.

CK: 60 TO 100 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/3, MATRIX DRY 10YR 7/3; GRAVELLY COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; STRONGLY CALCAREOUS; GRAVELLY COARSE FRAGMENTS.

JUL 25, 1984

LRY MANITOBA 1983 PROFILE NO. 14

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	7.4	4.62	0.24	17.4	3.0	13.2		23.1		18.8	3.8	0.1	1.1
AH	7.0	3.65	0.33				2.0	23.2		15.3	3.8	0.1	0.8
BM	7.6	0.83	0.09	16.1	2.0	13.0		12.5		13.1	2.4		0.1
BC	7.7			32.2	15.2	15.7		6.9		12.2	2.1		
CCA	7.8			33.6	11.2	20.7		3.1		11.6	1.5		
CK	8.0			27.3	6.8	18.9		1.7		9.1	0.6		

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AH	0.3	40.2
BM	0.3	25.0
BC	0.3	25.9
CCA	0.5	20.7
CK	0.3	19.2

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AH		97	96	94	16	45	11	4	3	79		11	10	
BM		88	61	51	6	41	20	6	6	79		13	8	
BC		86	53	40	18	47	12	6	6	89		10	1	
CCA		79	50	41	33	44	8	4	5	94		5	1	
CK		82	58	47	9	46	12	19	5	91		8	1	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AH								
BM								
BC								
CCA								
CK							11	07

JUL 25, 1984

LSW MANITOBA 1983 PROFILE NO. 25

IDENTIFICATION: SURVEYED BY WM, FOR THE PURPOSE OF RESEARCH SITE; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED REGO BLACK. MINERAL SOIL FAMILY: SANDY, MIXED NONCLAY, STRONGLY CALCAREOUS, COLD, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: LSW, ASSOCIATED SOILS: MNT.

LOCATION: MILITARY GRID REF. 14 UPK 7516 8344; NTS MAP AREA 62H ; SE 16 6 7 E.

SOIL SITE: PARENT MATERIAL 1: SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%); SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, RAPIDLY PERVIOUS, SLOW SURFACE RUNOFF, 1.6 M TO APPARENT WATERTABLE; SLIGHTLY STONY; PRESENT LAND USE: CROPLAND.

INTERPRETATIONS: CLI AGRICULTURE 2/W.

LH: 2 TO 0 CM; MUCKY FINE SANDY LOAM; WEAK STRUCTURE; PLENTIFUL, FINE AND COARSE, RANDOM ROOTS; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY.

AHK: 0 TO 14 CM; MATRIX DRY 10YR 3/1; FINE SANDY LOAM; WEAK, FINE, GRANULAR STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; PLENTIFUL, FINE AND MEDIUM, RANDOM ROOTS; MODERATE EFFERVESCENCE; MODERATELY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

AC: 14 TO 26 CM; 2.5Y 4/2, 2.5YR 5/2; LOAMY FINE SAND; FEW, MEDIUM, PROMINENT, 7.5YR 5/6 MOTTLES; FINE, GRANULAR STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; FEW, FINE, VERTICAL ROOTS; STRONG EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, CLEAR HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CCAGJ: 26 TO 42 CM; MATRIX MOIST 10YR 5/3, 10YR 5/2.5; LOAMY FINE SAND; FEW, FINE, DISTINCT, 10YR 5/8 MOTTLES; VERY WEAK, FINE, GRANULAR STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; FEW, FINE, VERTICAL ROOTS; MODERATE EFFERVESCENCE; MODERATELY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ1: 42 TO 48 CM; MATRIX MOIST 10YR 6.5/3, 10YR 7/3; FINE SAND; FEW, MEDIUM, PROMINENT, 10YR 5/8 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; FEW, FINE, VERTICAL ROOTS; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ2: 48 TO 51 CM; MATRIX MOIST 10YR 6.5/3, 10YR 7/4; GRAVELLY FINE SAND; COMMON, MEDIUM, 10YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; 40% GRAVELLY AND COBBLY COARSE FRAGMENTS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ3: 51 TO 76 CM; 2.5Y 7/2, 2.5Y 7/4; FINE SAND; MANY, COARSE, PROMINENT, 7.5YR 6/8 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ4: 76 TO 110 CM; 5Y 6.5/1.5, 5Y 7.5/2; MANY, COARSE, PROMINENT, 7.5YR 6/8 MOTTLES.

JUL 25, 1984

LSW MANITOBA 1983 PROFILE NO. 25

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
								BUFF.	PERM. CHARG	CA	MG	NA	K
LH	7.0	10.10	0.53	4.6	3.5	1.0		49.3		43.8	8.5	0.1	0.4
AHK	7.4	3.21	0.36	2.8	1.3	1.5		32.8		27.9	9.5	0.1	0.1
AC	7.5	0.43	0.08	7.6	2.2	5.0		7.2		14.5	2.4		0.1
CCAGJ	7.7	0.26		0.2	13.8	6.0	7.2	5.2		21.9	2.0		0.1
CKGJ1	7.7			7.3	2.9	4.1		2.1		18.3	0.7		
CKGJ2	7.7			6.7	5.1	1.5		1.9		22.4	0.9		
CKGJ3	7.6			2.5	1.2	1.2		2.3		19.6	0.7		
CKGJ4													

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH	0.9	114.3
AHK	0.6	68.4
AC	0.3	31.4
CCAGJ	0.5	29.0
CKGJ1	0.3	28.3
CKGJ2	0.3	28.5
CKGJ3	0.2	24.4
CKGJ4		

LSH MANITOBA 1983 PROFILE NO. 25

JUL 25, 1984

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH						1	6	52	13	72		20	8	
AHK						1	5	50	22	78		12	10	
AC						1	5	57	23	86		6	8	
CCAGJ						1	5	66	16	88		6	6	
CKGJ1						2	4	61	27	94		4	2	
CKGJ2							4	43	46	93		5	2	
CKGJ3						1	12	41	40	94		3	3	
CKGJ4														

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AHK								
AC								
CCAGJ								
CKGJ1								
CKGJ2								
CKGJ3							24	07
CKGJ4								

JUL 25, 1984

MNT MANITOBA 1982 PROFILE NO. 16

IDENTIFICATION: SURVEYED BY WM, FOR THE PURPOSE OF RESEARCH SITE; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: REGO HUMIC GLEYSOL. MINERAL SOIL FAMILY: COARSE LOAMY, MIXED NONCLAY, STRONGLY CALCAREOUS, COLD, AQUIC. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: MNT, ASSOCIATED SOILS: PPL.

LOCATION: MILITARY GRID REF. 14 UPK 7508 8344; NTS MAP AREA 62H ; SE 16 6 7 E.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, LACUSTRINE; LANDFORM CLASSIFICATION: LACUSTRINE, LEVEL; SLOPE: 0.2% SIMPLE SLOPE OF CLASS 1 (0-0.5%), FACING LEVEL, SITE AT DEPRESSION POSITION; SOIL MOISTURE AND DRAINAGE: AQUIC, POORLY DRAINED, RAPIDLY PERVIOUS, PONDED SURFACE RUNOFF, 1.3 M TO APPARENT WATERTABLE; NONSTONY; PRESENT LAND USE: FEN.

INTERPRETATIONS: CLI AGRICULTURE 6/W.

SPECIAL NOTES: WILLOW AND SEDGE, FEW CATTAILS.

OF: 20 TO 12 CM; MATRIX MOIST 5YR 3/2; ORGANIC; PLENTIFUL, FINE, RANDOM ROOTS; SMOOTH, ABRUPT HORIZON BOUNDARY.

OH: 12 TO 0 CM; MATRIX MOIST 5YR 2.5/1; ORGANIC; NONSTICKY CONSISTENCE; PLENTIFUL, VERY FINE, RANDOM ROOTS; SMOOTH, ABRUPT HORIZON BOUNDARY.

AH: 0 TO 20 CM, RANGE 10 TO 25 CM; MATRIX MOIST 10YR 2/1; LOAMY FINE SAND; VERY WEAK, VERY FINE TO FINE, PLATY STRUCTURE; NONSTICKY, NONPLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; VERY FINE, VERTICAL, CONTINUOUS, SIMPLE, VESICULAR PORES; WAVY, ABRUPT HORIZON BOUNDARY.

CG1: 20 TO 45 CM; MATRIX MOIST 2.5Y 6.5/2; VERY FINE SAND; STRUCTURELESS, SINGLE GRAIN STRUCTURE; NONSTICKY, LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL ROOTS; VERY FINE, VERTICAL, CONTINUOUS, SIMPLE, VESICULAR PORES.

CG2: 45 TO 70 CM; MATRIX MOIST 2.5Y 6.5/2; VERY FINE SAND; COMMON, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; NONSTICKY, LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL ROOTS; VERY FINE, VERTICAL, CONTINUOUS, SIMPLE, VESICULAR PORES.

CG3: 70 TO 100 CM; MATRIX MOIST 2.5Y 6.5/2; VERY FINE SAND; COMMON, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; NONSTICKY, LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERTICAL ROOTS; VERY FINE, VERTICAL, CONTINUOUS, SIMPLE, VESICULAR PORES.

CHEMICAL DATA (SURVEY)

						C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	PYRO EXTR C-%	TOTAL N (%)	EXTR ACID	BUFF.	PERM. CHARG	CA	MG	NA	K
OF	5.9	24.00	54.9	1.21	13.5	84.6		68.6	15.8	0.3	0.8
OH	5.8	42.60	99.9	2.32	17.7	186.0		110.3	20.7	0.2	0.4
AH	6.8	1.48		0.10	2.4	14.2		10.2	2.1	0.1	0.3
CG1	7.5				1.0	2.7		1.9	0.7	0.1	0.3
CG2	7.5					2.9		2.0	0.7	0.1	0.4
CG3	7.5					2.8		2.2	1.2	0.1	0.4

MNT MANITOBA 1982 PROFILE NO. 16

JUL 25, 1984

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
OF		
OH		
AH	0.3	29.1
CG1	0.2	29.9
CG2	0.2	28.4
CG3	0.2	31.4

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

				% PASSING										% OF SAMPLE				
HORIZON	RUB FIB %	UNRUB FIBRE %	% ASH	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY	BULK DENS G/CC
OF	34		51															
OH	8	44	30															0.52
AH									1	4	53	25	83		10	7		1.53
CG1										1	30	67	98		1	1		1.64
CG2								1	1	2	39	53	96		3	1		1.66
CG3										1	5	88	94		5	1		1.66

PHYSICAL DATA

	SURVEY (CON'T)					ENGINEERING							
	MOISTURE STATUS (%)												
HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
OF													
OH													
AH			4.8										
CG1													
CG2			1.6									24	07
CG3													

MNT MANITOBA 1982 PROFILE NO. 16 JUL 25, 1984

SPECIAL ANALYTICAL DATA

HORIZON	INFILTRATION RATE, STEADY STATE (CM/HR)	SATURATED. HYDRAULIC CONDUCTIVITY (CM/HR)
OF		
OH		
AH		0.9
CG1		2.8
CG2		
CG3		

JUL 25, 1984

MNT MANITOBA 1982 PROFILE NO. 17

IDENTIFICATION: SURVEYED BY WM, FOR THE PURPOSE OF RESEARCH SITE; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: REGO HUMIC GLEYSOL. MINERAL SOIL FAMILY: COARSE LOAMY, MIXED NONCLAY, STRONGLY CALCAREOUS, COLD, AQUIC. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: MNT, ASSOCIATED SOILS: PPL.

LOCATION: MILITARY GRID REF. 14 UPK 7511 8341; NTS MAP AREA 62H ; SE 16 6 7 E.

SOIL SITE: PARENT MATERIAL 1: SANDY, LACUSTRINE; LANDFORM CLASSIFICATION: LACUSTRINE, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%); SOIL MOISTURE AND DRAINAGE: AQUIC, POORLY DRAINED, RAPIDLY PERVIOUS, PONDED SURFACE RUNOFF, 0.8 M TO APPARENT WATERTABLE.

INTERPRETATIONS: CLI AGRICULTURE 6/W.

SPECIAL NOTES: THERE IS A CONSIDERABLE AMOUNT OF TURBATION BETWEEN THE AH AND CCAG:ALSO BETWEEN THE CCAG AND THE CKG. THE CCAG2 REFLECTS THIS MIXTURE

APK: 0 TO 15 CM; MATRIX MOIST 10YR 2/2; MUCKY FINE SANDY LOAM; FRIABLE, NONPLASTIC CONSISTENCE; ABUNDANT, VERY FINE AND FINE, RANDOM ROOTS; MODERATE EFFERVESCENCE; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

AHK: 15 TO 25 CM; MATRIX MOIST 10YR 2/2; MUCKY LOAM; WEAK, FINE, PLATY STRUCTURE; WEAK TO MODERATE, FINE TO MEDIUM, GRANULAR SECONDARY STRUCTURE; FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; ABUNDANT, VERY FINE AND FINE, RANDOM ROOTS; COMMON, VERY FINE, VERTICAL AND HORIZONTAL, CONTINUOUS PORES; MODERATE EFFERVESCENCE; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CCAG1: 25 TO 45 CM; MATRIX MOIST 5Y 5/2; FINE SANDY LOAM; FRIABLE CONSISTENCE; PLENTIFUL, VERY FINE, VERTICAL ROOTS; COMMON, VERY FINE, VERTICAL, CONTINUOUS PORES; STRONG EFFERVESCENCE; STRONGLY CALCAREOUS; IRREGULAR, GRADUAL HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CCAG2: 45 TO 60 CM; MATRIX MOIST 5Y 6/3, MATRIX MOIST 5Y 5/2; FINE SANDY LOAM; FEW, FINE, PROMINENT, 10YR 5/6 MOTTLES; VERY FRIABLE, NONPLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; COMMON, VERY FINE, CONTINUOUS PORES; STRONG EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, CLEAR HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKG1: 60 TO 85 CM; MATRIX MOIST 5Y 6/2; VERY FINE SAND; MANY, COARSE, PROMINENT, 5YR AND 7.5YR 5/6 AND 5/8 MOTTLES; FEW, MEDIUM, PROMINENT, 7.5YR 3/2 MOTTLES; NONSTICKY, LOOSE, NONPLASTIC CONSISTENCE; WEAK EFFERVESCENCE; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
APK	7.9	7.40	0.43	29.2	23.4	5.3	38.3		29.0	8.0	0.2	0.5
AHK	7.9	8.55	0.61	41.0	37.6	3.2	41.5		31.6	7.7	0.1	0.4
CCAG1	7.8			23.0	18.1	4.5	6.2		16.6	2.4	0.1	0.3
CCAG2	7.8			21.5	17.8	3.3	5.4		16.7	1.9	0.1	0.2
CKG1	7.8			18.9	12.0	6.3	2.4		10.2	0.8		0.1

MNT MANITOBA 1982 PROFILE NO. 17

JUL 25, 1984

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
APK	0.6	98.7
AHK	0.6	118.3
CCAG1	0.4	31.7
CCAG2	0.4	30.6
CKG1	0.3	33.2

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING				% OF SAMPLE									
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
APK						1	5	35	13	54		27	19	
AHK					1	1	3	28	15	48		36	16	
CCAG1						1	4	52	20	77		10	13	
CCAG2					1	1	4	49	25	80		9	11	
CKG1							2	20	70	92		7	1	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
APK								
AHK								
CCAG1	17.0	19.0	20.0				24	07
CCAG2								
CKG1							40	07

JUL 25, 1984

MNT MANITOBA 1983 PROFILE NO. 21

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. EXTENSIVE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: RECO HUMIC GLEYSOL. MINERAL SOIL FAMILY: SANDY, MIXED NONCLAY, ALKALINE, STRONGLY CALCAREOUS, COLD, SUBAQUIC. SOIL MAP UNIT: NOTATION: MNT, ASSOCIATED SOILS: PANAND PPL.

LOCATION: MILITARY GRID REF. 14 UPK 8808 9462; NTS MAP AREA 62H ; SW 14 7 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 11 DEG(C) AT 20 CM IN JUNE, NO. 2 WAS 6 DEG(C) AT 50 CM IN JUNE.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: 0.5% SIMPLE SLOPE OF CLASS 1 (0-0.5%), FACING LEVEL, SITE AT DEPRESSION POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBAQUIC, POORLY DRAINED, RAPIDLY PERVIOUS, VERY SLOW SURFACE RUNOFF, SEEPAGE PRESENT, 0.6 M TO APPARENT WATERTABLE; NONSTONY; NONROCKY; PRESENT LAND USE: CROPLAND.

INTERPRETATIONS: CLI AGRICULTURE 4/W.

SPECIAL NOTES: DEPENDING ON WHICH SIDE OF HOLE YOU LOOKED AT HAD DIFFERENT PROFILE. PIT COLLAPSED VERY QUICKLY DUE TO HIGH WATER TABLE.

APK: 0 TO 20 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/1, MATRIX DRY 10YR 4/1; LOAMY FINE SAND; MASSIVE STRUCTURE; FRIABLE CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY.

CKG1: 20 TO 55 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/6, MATRIX DRY 10YR 6/8; FINE SAND; MANY, COARSE, PROMINENT, 7.5YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; NONSTICKY CONSISTENCE; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY.

CKG2: 55 TO 75 CM; HORIZON WET; MATRIX MOIST 10YR 7/2, MATRIX DRY 10YR 8/1; FINE SAND; FEW, FINE, DISTINCT, 10YR 6/8 MOTTLES; STRUCTURELESS STRUCTURE; NONSTICKY CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY.

CKG3: 75 TO 100 CM; HORIZON WET; MATRIX MOIST 10YR 5/6, MATRIX DRY 10YR 7/6; FINE SAND; COMMON, FINE, DISTINCT MOTTLES; STRUCTURELESS STRUCTURE; NONSTICKY CONSISTENCE; .

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	EXCHANGEABLE CATIONS BUFFERED (ME/100G) MG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) NA	EXCHANGEABLE CATIONS BUFFERED (ME/100G) K
APK	7.6	4.81	0.23	4.8	2.7	1.9	27.5		26.5	4.9	0.1	1.0
CKG1	7.7			4.4		4.1	2.3		3.2	1.4		
CKG2	8.0			3.8		3.5	1.1		4.3	0.3		
CKG3	8.0			7.3	5.1	2.0	1.5		11.0	0.3		

MNT MANITOBA 1983 PROFILE NO. 21

JUL 25, 1984

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
APK	1.2	53.9
CKG1	0.6	32.3
CKG2	0.4	29.5
CKG3	0.9	33.9

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
APK						1	5	58	17	81		11	8	
CKG1						1	2	58	34	95		3	2	
CKG2					1	1	2	42	49	95		4	1	
CKG3							1	74	19	94		4	2	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
APK								
CKG1								
CKG2								
CKG3							30	07

NOV 23, 1983

MAR MANITOBA 1980 PROFILE NO. 26

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; VERY LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED CUMULIC REGOSOL. MINERAL SOIL FAMILY: COARSE LOAMY, ALKALINE, STRONGLY CALCAREOUS, COLD, HUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: LAB, ASSOCIATED SOILS: KIC.

LOCATION: MILITARY GRID REF. 14 UPK 6192 5470; NTS MAP AREA 62H ; SW 19 3 6 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 20 DEG(C) AT 20 CM IN JULY, NO. 2 WAS 16 DEG(C) AT 50 CM IN JULY, NO. 3 WAS 15 DEG(C) AT 100 CM IN JULY.

VEGETATION: FOREST,HARDWOOD, UNDISTURBED. KEY SPECIES LISTING: 1 FRAXINUS AMERICANA - WHITE ASH, 2 FRAXINUS NIGRA - BLACK ASH, 3 POPULUS BALSAMIFERA - BALSAM POPLAR. SALIX, DOGWOOD, GRASSES.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, STRATIFIED (MINERAL AND ORGANIC), WEAKLY CALCAREOUS (1 TO 6% CACO3), FLUVIAL, MIXED; PARENT MATERIAL 2: UNSPECIFIED WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), MORAINAL (TILL); LANDFORM CLASSIFICATION: FLUVIAL; SLOPE: 2% SIMPLE SLOPE OF CLASS 2 (0.5-2%), FACING WEST, SITE AT LOWER SLOPE POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: HUMID, IMPERFECTLY DRAINED, MODERATELY PERVIOUS. MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; SLIGHTLY STONY AND MODERATELY STONY; PRESENT LAND USE: NATURAL GRAZING.

INTERPRETATIONS: CLI AGRICULTURE 6/W.

SPECIAL NOTES: MOTTLES IN 2 CKG APPEAR AROUND ROOT CHANNELS

AH1: 0 TO 40 CM; HORIZON MOIST; MATRIX MOIST 5YR 2/2, MATRIX DRY 10YR 3/1; LOAMY VERY FINE SAND AND ORGANIC; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, COARSE, HORIZONTAL ROOTS; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG1: 40 TO 45 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/3, MATRIX DRY 10YR 7/3; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; FEW, MICRO, VERTICAL ROOTS; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

AH2: 45 TO 60 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/2, MATRIX DRY 10YR 4/1; LOAMY FINE SAND AND ORGANIC; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

AH3: 60 TO 90 CM; HORIZON MOIST; MATRIX MOIST 7.5YR 4/4, MATRIX DRY 10YR 5/4; GRAVELLY SAND AND ORGANIC; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

2CKG: 90 TO 110 CM; HORIZON MOIST; MATRIX MOIST 5Y 5/1, MATRIX DRY 5Y 6/1; SILT LOAM; FEW, FINE, DISTINCT, 10YR 5/8 MOTTLES; STRUCTURELESS, MASSIVE STRUCTURE; FIRM, PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; VERY STRONGLY CALCAREOUS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

NOV 23, 1983

MAR MANITOBA 1980 PROFILE NO. 26

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
AH1	7.0	16.89	1.01				6.5	47.7		31.2	7.5	0.1	0.1
CKG1	7.2	0.91	0.05	5.3	0.0	4.9		3.5		2.3	1.0	0.1	
AH2	7.3	3.19	0.18				1.0	11.0		6.9	1.8	0.1	
AH3	7.5	2.25	0.14	21.0	0.0	19.4		6.7		5.2	2.1	0.1	
2CKG	7.8			44.8	14.3	28.1		4.7		17.1	1.5	0.1	0.2

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
AH1	0.6	57.0
CKG1	0.3	36.0
AH2	0.3	56.0
AH3	0.5	14.0
2CKG	0.6	27.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AH1					2	2	7	31	29	71		14	15	
CKG1				96	4	29	36	20	5	94		5	1	
AH2				28	12	9	14	37	19	91		6	3	
AH3				32	24	24	18	17	7	90		8	2	
2CKG					4	5	18	14	14	45		41	14	

NOV 23, 1983

MAR MANITOBA 1980 PROFILE NO. 26

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
AH1								
CKG1								
AH2								
AH3								
2CKG	12.0	17.0	12.7				12	17

DEC 19, 1981

MEB MANITOBA 1980 PROFILE NO. 18

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: REGO HUMIC GLEYSOL. MINERAL SOIL FAMILY: COARSE LOAMY, CARBONATIC, ALKALINE, EXTREMELY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: NOTATION: MEB, ASSOCIATED SOILS:PLN AND IWO.

LOCATION: MILITARY GRID REF. 14 UPK 6165 5275; NTS MAP AREA 62H ; SW 18 3 6 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 19 DEG(C) AT 20 CM IN JULY, NO. 2 WAS 19 DEG(C) AT 50 CM IN JULY, NO. 3 WAS 17 DEG(C) AT 100 CM IN JULY.

VEGETATION: GRASSES,FORBES AND SHRUBS, UNDISTURBED. KEY SPECIES LISTING: 1 SALIX - WILLOW. GRASSES,ROSACEAE,CAREX,KALMS LOBELIA, SOLIDAGO, YARROW, PALE GERARDIA.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), MORAINAL (TILL), MIXED; LANDFORM CLASSIFICATION: MORAINAL, LOAMY, LEVEL; SLOPE: 0.5% SIMPLE SLOPE OF CLASS 1 (0-0.5%), LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: PERHUMID, POORLY DRAINED, SLOWLY PERVIOUS, VERY SLOW SURFACE RUNOFF, SEEPAGE ABSENT; MODERATELY STONY AND VERY STONY; PRESENT LAND USE: NATURAL GRAZING.

SPECIAL NOTES: IS A CARBONATED REGO HUMIC GLEYSOL

LH: 2 TO 0 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/2, MATRIX DRY 10YR 4/2; ORGANIC; SMOOTH, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

AHK: 0 TO 12 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 3/1; SANDY CLAY LOAM; MODERATE, MEDIUM, GRANULAR STRUCTURE; SLIGHTLY PLASTIC CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; MODERATELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; IRREGULAR, GRADUAL HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG1: 12 TO 28 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 6/2, MATRIX DRY 10YR 8/1; FINE SANDY LOAM; FEW, FINE, FAINT MOTTLES; WEAK, MEDIUM, GRANULAR STRUCTURE; PLASTIC CONSISTENCE; SLIGHTLY POROUS; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; IRREGULAR, GRADUAL HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKG2: 28 TO 80 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 8/2; FINE SANDY LOAM; COMMON, MEDIUM, DISTINCT, 2.5Y 6/6 MOTTLES; WEAK TO MODERATE, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; WEAK TO MODERATE, FINE TO MEDIUM, PLATY SECONDARY STRUCTURE PSEUDO; SLIGHTLY PLASTIC CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKG3: 80 TO 100 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 8/2; FINE SANDY LOAM; COMMON, MEDIUM, DISTINCT, 2.5Y 6/6 MOTTLES; WEAK TO MODERATE, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; WEAK TO MODERATE, MEDIUM TO COARSE, PLATY SECONDARY STRUCTURE PSEUDO; SLIGHTLY PLASTIC CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

MEB MANITOBA 1980 PROFILE NO. 18

DEC 19, 1981

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	7.5	17.24	0.53	13.4	9.3	3.8	1.0	32.8		53.7	12.3	0.1	2.4
AHK	7.7	2.96	0.22	11.9	3.9	7.3		25.2		22.5	5.7	0.1	0.3
CKG1	7.9			42.2	13.3	26.7		5.1		15.7	1.4	0.1	0.1
CKG2	7.9			44.2	7.9	33.5		4.2		13.1	1.7	0.1	0.1
CKG3	7.9			42.2	14.0	26.0		3.9		14.2	2.0	0.1	0.1

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AHK	1.0	50.0
CKG1	0.6	22.0
CKG2	0.3	23.0
CKG3	0.4	24.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AHK					2	6	13	22	15	58		10	32	
CKG1				81	6	5	9	16	13	54		33	13	
CKG2				90	5	6	9	16	16	52		37	11	
CKG3				90	4	6	9	17	16	52		37	11	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AHK								
CKG1								
CKG2	13.0	15.0	14.0					
CKG3							40	09

DEC 19, 1981

PAN MANITOBA 1980 PROFILE NO. 16

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED ELUVIATED EUTRIC BRUNISOL. MINERAL SOIL FAMILY: SANDY, ALKALINE, STRONGLY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: PAN, ASSOCIATED SOILS: MNT.

LOCATION: MILITARY GRID REF. 14 UPK 8450 5905; NTS MAP AREA 62H ; SE 32 3 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 20 DEG(C) AT 20 CM IN JULY, NO. 2 WAS 19 DEG(C) AT 50 CM IN JULY, NO. 3 WAS 15 DEG(C) AT 100 CM IN JULY.

VEGETATION: FOREST,UNSPEC., UNDISTURBED. KEY SPECIES LISTING: 1 POPULUS TREMULOIDES - TREMBLING ASPEN. GRASSES.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, WEAKLY CALCAREOUS (1 TO 6% CACO3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%); SOIL MOISTURE AND DRAINAGE: SUBHUMID, MODERATELY WELL DRAINED AND IMPERFECTLY DRAINED, MODERATELY PERVIOUS, MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; PRESENT LAND USE: WOODLAND GRAZING.

INTERPRETATIONS: CLI AGRICULTURE 3/MW.

LH: 3 TO 0 CM; MATRIX DRY 10YR 4/2, MATRIX MOIST 10YR 3/1; ORGANIC; PLENTIFUL, VERY FINE, RANDOM ROOTS; MODERATELY POROUS; WAVY, CLEAR HORIZON BOUNDARY; SLIGHTLY ACID 6.1-6.5 FIELD PH.

AE: 0 TO 10 CM; MATRIX DRY 10YR 6.5/1, MATRIX MOIST 10YR 5/3; FINE SAND; STRUCTURELESS, SINGLE GRAIN STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; ABUNDANT, MICRO, VERTICAL ROOTS; MODERATELY POROUS; WAVY, CLEAR HORIZON BOUNDARY; STRONGLY ALKALINE 8.5 FIELD PH.

AEGJ: 10 TO 35 CM; MATRIX DRY 10YR 7/4, MATRIX MOIST 10YR 5/6; FINE SAND; FEW, FINE, FAINT MOTTLES; 5YR 6/8 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; ABUNDANT, MICRO, VERTICAL ROOTS; MODERATELY POROUS; IRREGULAR, GRADUAL HORIZON BOUNDARY; STRONGLY ALKALINE 8.5 FIELD PH.

BMGJ: 35 TO 80 CM; MATRIX DRY 10YR 6/6, MATRIX MOIST 10YR 5/6; FINE SAND; COMMON, COARSE, DISTINCT, 5YR 4/8 MOTTLES; WEAK, MEDIUM TO COARSE, SUBANGULAR BLOCKY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, FINE, HORIZONTAL ROOTS; MODERATELY POROUS; WAVY, CLEAR HORIZON BOUNDARY; MEDIUM ACID 5.6-6.0 FIELD PH.

CKG1: 80 TO 120 CM; MATRIX DRY 10YR 7/3, MATRIX MOIST 10YR 6/3; FINE SAND; FEW, FINE, FAINT MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, FINE, HORIZONTAL ROOTS; MODERATELY POROUS; VERY WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

DEC 19, 1981

PAN MANITOBA 1980 PROFILE NO. 16

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL- CITE (%)	DOLO- MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	6.2	15.92	0.68				11.1	40.6		20.8	8.2	0.1	1.3
AE	5.4	0.45	0.03				2.0	4.5		1.2	0.5	0.1	
AEGJ	5.3	0.16	0.01				1.0	3.6		1.6	0.4	0.1	
BMGJ	5.8	0.14	0.01				1.0	5.6		2.8	0.9	0.1	0.1
CKG1	7.5			8.6	2.8	5.4		1.3		4.5	0.3	0.2	

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AE	0.2	23.0
AEGJ	0.1	24.0
BMGJ	0.1	23.0
CKG1	0.1	24.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AE					2	5	22	58	8	95		4	1	
AEGJ					1	5	20	59	11	96		3	1	
BMGJ						7	24	52	11	94		2	4	
CKG1						2	9	53	33	97		2	1	

PAN MANITOBA 1980 PROFILE NO. 16

DEC 19, 1981

PHYSICAL DATA

SURVEY (CON'T)

MOISTURE STATUS (%)

HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST
LH					
AE	13.6	5.4	2.1		
AEGJ					
BMGJ	9.4	5.0	3.1		
CKG1	15.0	2.3	1.0		

DEC 19, 1981

PAN MANITOBA 1980 PROFILE NO. 14

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; DEVIATION(S): DRAINAGE; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED ELUVIATED EUTRIC BRUNISOL. MINERAL SOIL FAMILY: SANDY, ALKALINE, STRONGLY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: PAN, ASSOCIATED SOILS:MNT AND FPL.

LOCATION: MILITARY GRID REF. 14 UPK 8453 5750; NTS MAP AREA 62H ; SE 29 3 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 18 DEG(C) AT 50 CM IN JUNE, NO. 2 WAS 15 DEG(C) AT 100 CM IN JUNE.

VEGETATION: FOREST,HARDWOOD, CLEAR-CUT. KEY SPECIES LISTING: 1 POPULUS TREMULOIDES - TREMBLING ASPEN, 2 ALNUS - ALDER. SASKATOON, CHOKECHERRY,PINCHERRY, DOGWOOD, ROSACEAE, GRASSES, NORTHERN BEDSTRAW.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%), FACING WEST, SITE AT MIDDLE POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: HUMID, IMPERFECTLY DRAINED, MODERATELY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE PRESENT, 1.8 M TO APPARENT WATERTABLE; NONSTONY; PRESENT LAND USE: SAND.

INTERPRETATIONS: CLI AGRICULTURE 3/MW.

LH: 2 TO 0 CM; HORIZON DRY; MATRIX MOIST , MATRIX DRY ; STRUCTURELESS STRUCTURE; VERY FEW, MEDIUM, RANDOM ROOTS; SLIGHTLY POROUS; SMOOTH, CLEAR HORIZON BOUNDARY; MEDIUM ACID 5.6-6.0 FIELD PH.

AEGJ: 0 TO 20 CM; HORIZON DRY; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 7/2; FINE SAND; FEW, FINE, DISTINCT MOTTLES; STRUCTURELESS STRUCTURE; HARD CONSISTENCE; VERY FEW, MEDIUM, RANDOM ROOTS; SLIGHTLY POROUS; WAVY, CLEAR HORIZON BOUNDARY; MEDIUM ACID 5.6-6.0 FIELD PH.

BMGJ1: 20 TO 60 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 7/4, MATRIX DRY 10YR 6/4; FINE SAND; MANY, MEDIUM, PROMINENT, 7.5YR 5/6 MOTTLES; STRUCTURELESS STRUCTURE; SLIGHTLY HARD CONSISTENCE; VERY FEW, MEDIUM, RANDOM ROOTS; SLIGHTLY POROUS; WAVY, CLEAR HORIZON BOUNDARY; SLIGHTLY ACID 6.1-6.5 FIELD PH.

BMGJ2: 60 TO 70 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 5/4, MATRIX DRY 10YR 7/3; FINE SAND; FEW, MEDIUM, DISTINCT MOTTLES; STRUCTURELESS STRUCTURE; VERY FRIABLE CONSISTENCE; VERY FEW, MEDIUM, RANDOM ROOTS; SLIGHTLY POROUS; SMOOTH, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG1: 70 TO 100 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 7/4, MATRIX DRY 10YR 7/3; FINE SAND; MANY, MEDIUM, PROMINENT MOTTLES; 7.5YR 6/8 MOTTLES; STRUCTURELESS STRUCTURE; VERY FRIABLE CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; IRREGULAR, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CCAG: 100 TO 120 CM; HORIZON MOIST; MATRIX MOIST 5Y 7/1, MATRIX DRY 2.5Y 8/6; FINE SANDY LOAM; COMMON, MEDIUM, DISTINCT MOTTLES; 7.5YR 6/8 MOTTLES; STRUCTURELESS STRUCTURE; FRIABLE CONSISTENCE; SLIGHTLY POROUS; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; FIRM CONSISTENCE, 5Y 7/1; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG2: 120 TO 135 CM; HORIZON WET; MATRIX MOIST 10YR 7/4, MATRIX DRY 10YR 8/4; FINE SAND; FEW, FINE, FAINT MOTTLES; STRUCTURELESS STRUCTURE; NONSTICKY CONSISTENCE; SLIGHTLY POROUS; VERY WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

DEC 19, 1981

PAN MANITOBA 1980 PROFILE NO. 14

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	5.7	54.30	2.20				20.3	87.1		51.0	16.4	0.1	4.0
AEGJ	5.6	0.37	0.02				1.2	3.2		1.2	0.4	0.1	
BMGJ1	6.2	0.13	0.01				0.7	3.5		2.1	0.4	0.1	
BMGJ2	7.5	0.21	0.03	0.8			0.2	3.5		2.7	1.3	0.1	0.1
CKG1	7.7			7.5	4.3	2.9		2.7		9.6	0.5	0.1	
CCAG	7.7			57.0	48.5	7.8		4.7		17.6	1.0	0.1	
CKG2	7.7			7.2	1.1	5.6		1.2		3.0	0.3	0.1	

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AEGJ	0.2	23.0
BMGJ1	0.2	22.0
BMGJ2	0.4	21.0
CKG1	0.7	23.0
CCAG	0.3	30.0
CKG2	0.2	25.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AEGJ						2	12	64	19	97		3	0	
BMGJ1						1	13	71	13	98		1	1	
BMGJ2					2	6	16	61	8	93		2	5	
CKG1					1	6	20	57	12	96		3	1	
CCAG						2	6	56	6	70		14	16	
CKG2					1	4	12	69	12	98		2	0	

JUL 25, 1984

PAN MANITOBA 1983 PROFILE NO. 11

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED ELUVIATED EUTRIC BRUNISOL. MINERAL SOIL FAMILY: SANDY, NEUTRAL, COLD, HUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: PAN, ASSOCIATED SOILS: LSDAND MNT.

LOCATION: MILITARY GRID REF. 14 UPK 8550 8330; NTS MAP AREA 62H ; SE 16 6 8 E.

VEGETATION: KEY SPECIES LISTING: 1 PINUS BANKSIANA - JACK PINE, 2 POPULUS TREMULOIDES - TREMBLING ASPEN, 3 CORNUS ALTERNIFOLIA - ALTERNATE-LEAVED DOGWOOD. ROSACEAE,ARCTOSTAPHYLOS UVA URSI, EQUISETUM.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SANDY, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), GLACIOLACUSTRINE, MIXED; SLOPE: 1.5% COMPLEX SLOPE OF CLASS 2 (0.5-2%), FACING EAST, SITE AT MIDDLE POSITION; SOIL MOISTURE AND DRAINAGE: HUMID, IMPERFECTLY DRAINED, RAPIDLY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE PRESENT, 0.9 M TO APPARENT WATERTABLE; NONSTONY; NONROCKY; PRESENT LAND USE: UNPRODUCTIVE WOODLAND.

LH: 2 TO 0 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/1; ORGANIC; STRUCTURELESS STRUCTURE; ABUNDANT, FINE, HORIZONTAL ROOTS; SMOOTH, CLEAR HORIZON BOUNDARY.

AHE: 0 TO 6 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/1, MATRIX DRY 10YR 6/1; FINE SAND; STRUCTURELESS STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; FEW, MEDIUM, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

AE: 6 TO 26 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/2, MATRIX DRY 10YR 7/2; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, MEDIUM, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BMGJ: 26 TO 86 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 7/4; FINE SAND; MANY, MEDIUM, DISTINCT, 5YR 4/8 MOTTLES; STRUCTURELESS STRUCTURE; NONSTICKY, NONPLASTIC CONSISTENCE; WAVY, GRADUAL HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

CG: 86 TO 110 CM; HORIZON WET; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 8/3; FINE SAND; MANY, MEDIUM, DISTINCT, 5YR 4/8 MOTTLES; STRUCTURELESS STRUCTURE; NONSTICKY, NONPLASTIC CONSISTENCE; NEUTRAL 6.6-7.3 FIELD PH.

CHEMICAL DATA (SURVEY)

						C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	EXTR ACID	BUFF.	PERM. CHARG	CA	MG	NA	K
LH	5.9	12.34	0.56	0.0	10.0	56.8		36.8	5.1	0.1	1.8
AHE	5.8	1.87	0.09	0.0	2.2	12.8		7.8	1.0		0.2
AE	6.6	0.11	0.01	0.0		2.4		1.9	0.3		0.2
BMGJ	6.5	0.10	0.01	0.0		2.7		2.1	0.5		0.2
CG	6.8			0.0		1.8		1.6	0.4		0.1

JUL 25, 1984

PAN MANITOBA 1983 PROFILE NO. 11

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH	0.5	161.0
AHE	0.2	44.3
AE	0.1	29.5
BMGJ	0.1	30.0
CG	0.2	29.3

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING										% OF SAMPLE			
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AHE							2	57	32	91		5	4	
AE							2	70	24	96		2	2	
BMGJ							2	54	39	95		3	2	
CG							2	66	28	96		2	2	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AHE								
AE								
BMGJ								
CG							24	07

DEC 19, 1981

PLN MANITOBA 1980 PROFILE NO. 15

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED DARK GRAY. MINERAL SOIL FAMILY: LOAMY, CARBONATIC, ALKALINE, EXTREMELY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: PLN, ASSOCIATED SOILS: SPG.

LOCATION: MILITARY GRID REF. 14 UPK 6160 5370; NTS MAP AREA 62H ; SW 18 3 6 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 18 DEG(C) AT 20 CM IN JULY, NO. 2 WAS 18 DEG(C) AT 50 CM IN JULY.

VEGETATION: KEY SPECIES LISTING: 1 POPULUS TREMULOIDES - TREMBLING ASPEN. FEW SMALL OAK, GRASSES MEADOW RHUE,PALE COMMANDRA, NORTHERN BEDSTRAW.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, STRATIFIED (MINERAL), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; PARENT MATERIAL 2: UNSPECIFIED WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), MORAINAL (TILL), MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, BOULDERY, LEVEL; SLOPE: 0.5% SLOPE OF CLASS 1 (0-0.5%), LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, SLOWLY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE ABSENT; VERY STONY; PRESENT LAND USE: WOODLAND GRAZING.

INTERPRETATIONS: CLI AGRICULTURE 3/WM.

LH: 2 TO 0 CM; HORIZON MOIST; MATRIX DRY 2.5Y 4/4, MATRIX MOIST ; PLENTIFUL, MICRO, RANDOM ROOTS; SMOOTH, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

AH: 0 TO 8 CM; HORIZON MOIST; MATRIX DRY 10YR 4/1, MATRIX MOIST 10YR 3/1; LOAMY SAND; FEW, FINE, FAINT, 10YR 5/8 MOTTLES; WEAK, FINE, GRANULAR STRUCTURE; LOOSE CONSISTENCE; PLENTIFUL, MICRO, RANDOM ROOTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

AHE: 8 TO 11 CM; HORIZON MOIST; MATRIX DRY 10YR 5.5/2, MATRIX MOIST 10YR 4.5/3; LOAMY SAND; FEW, FINE, FAINT, 10YR 5/8 MOTTLES; WEAK, FINE, GRANULAR STRUCTURE; LOOSE CONSISTENCE; VERY FEW, VERY FINE, RANDOM ROOTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BMGJ1: 11 TO 20 CM; HORIZON MOIST; MATRIX DRY 10YR 5.5/4, MATRIX MOIST 10YR 5/4; LOAMY SAND; FEW, FINE, FAINT, 10YR 5/8 MOTTLES; WEAK, VERY FINE TO FINE, GRANULAR STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; VERY FEW, VERY FINE, RANDOM ROOTS; WAVY, GRADUAL HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BMGJ2: 20 TO 35 CM; HORIZON MOIST; MATRIX DRY 10YR 5.5/4, MATRIX MOIST 10YR 5/4; SAND; FEW, FINE, FAINT, 10YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; VERY FRIABLE CONSISTENCE; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

2CKG1: 35 TO 50 CM; HORIZON MOIST; MATRIX DRY 10YR 8/1, MATRIX MOIST 10YR 7/3; SANDY CLAY; FEW, FINE, FAINT, 10YR 5/8 MOTTLES; MODERATE, VERY COARSE, PLATY STRUCTURE PSEUDO; MODERATE, MEDIUM, PLATY SECONDARY STRUCTURE; FIRM, SLIGHTLY PLASTIC CONSISTENCE; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; IRREGULAR, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

2CKG2: 50 TO 80 CM; HORIZON DRY; MATRIX DRY 10YR 7/3, MATRIX MOIST 10YR 7/2; LOAM; FEW, FINE, FAINT, 10YR 5/8 MOTTLES; STRONG, COARSE, PLATY STRUCTURE PSEUDO; STRONG, MEDIUM, PLATY SECONDARY STRUCTURE; FIRM, SLIGHTLY PLASTIC CONSISTENCE; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

PLN MANITOBA 1980 PROFILE NO. 15

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	6.8	27.79	0.68				6.2	53.8		44.0	10.4	0.2	2.0
AH	6.6	2.68	0.15				1.9	14.8		8.9	3.1	0.2	0.2
AHE	6.8	0.92	0.05				0.9	8.9		4.6	2.1	0.1	0.1
BMGJ1	6.9	0.32	0.01				0.7	9.6		4.7	2.6	0.1	0.1
BMGJ2	7.1	0.32	0.02	3.6	0.5	2.9		5.7		3.6	1.9	0.1	0.1
2CKG1	7.6			41.2	17.0	22.3		6.2		14.5	2.4	0.1	0.1
2CKG2	8.0			39.8	17.4	20.6		5.3		14.8	2.6	0.1	0.1

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH		
AH	0.4	41.0
AHE	0.4	26.0
BMGJ1	0.2	28.0
BMGJ2	0.2	27.0
2CKG1	0.6	28.0
2CKG2	0.5	25.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AH					1	6	29	41	6	83		9	8	
AHE				91	1	6	29	44	6	66		7	7	
BMGJ1					1	7	34	42	4	68		5	7	
BMGJ2					4	6	29	45	7	91		5	4	
2CKG1				91	5	6	9	16	14	50		7	43	
2CKG2				91	4	6	9	17	16	52		28	20	

PLN MANITOBA 1980 PROFILE NO. 15

PHYSICAL DATA

	SURVEY (CON'T)					ENGINEERING							
	MOISTURE STATUS (%)												
HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIGUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH													
AH	22.8	14.0	7.4										
AHE													
BMGJ1	14.5	8.1	4.5										
BMGJ2													
2CKG1													
2CKG2	18.9	13.6	5.1			12.0	16.0	15.7				40	09

DEC 19, 1981

PPL MANITOBA 1980 PROFILE NO. 17

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. EXTENSIVE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED DARK GRAY. MINERAL SOIL FAMILY: SANDY, STRONGLY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: PPL, ASSOCIATED SOILS: MAN AND MNT.

LOCATION: MILITARY GRID REF. 14 UPK 7763 5969; NTS MAP AREA 62H ; NE 34 3 7 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 17 DEG(C) AT 20 CM IN JULY, NO. 2 WAS 15 DEG(C) AT 50 CM IN JULY, NO. 3 WAS 11 DEG(C) AT 100 CM IN JULY.

VEGETATION: CROPS-FIELD (MANAGED), CROPPED. ROSACEAE, GRASSES.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: 0.5% SIMPLE SLOPE OF CLASS 1 (0-0.5%), LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, MODERATELY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; PRESENT LAND USE: IMPROVED PASTURE,FORAGE.

INTERPRETATIONS: CLI AGRICULTURE 3/MN.

SPECIAL NOTES: SOIL WAS A GLEYED ELUVIATED EUTRIC BRUNISOL BEFORE CULTIVATION

AP: 0 TO 12 CM; HORIZON DRY; MATRIX MOIST 10YR 3/1, MATRIX DRY 10YR 4/1; LOAMY FINE SAND; WEAK, FINE TO MEDIUM, GRANULAR STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; SLIGHTLY POROUS; SMOOTH, ABRUPT HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

AEJ: 12 TO 18 CM; HORIZON DRY; MATRIX MOIST 10YR 4/3, MATRIX DRY 10YR 6/3; FINE SAND; WEAK, FINE TO MEDIUM, SUBANGULAR BLOCKY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; SLIGHTLY POROUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

BMGJ: 18 TO 40 CM; HORIZON DRY; MATRIX MOIST 10YR 3.5/3, MATRIX DRY 10YR 5/3; FINE SAND; WEAK, MEDIUM TO COARSE, SUBANGULAR BLOCKY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; SLIGHTLY POROUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG1: 40 TO 55 CM; HORIZON DRY; MATRIX MOIST 10YR 6/3, MATRIX DRY 10YR 7/1; LOAMY FINE SAND; VERY WEAK, FINE TO MEDIUM, SUBANGULAR BLOCKY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; MODERATELY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG2: 55 TO 120 CM; HORIZON DRY; MATRIX MOIST 2.5Y 7/4, MATRIX DRY 2.5Y 7/2; FINE SAND; FEW, COARSE, FAINT, 10YR 6/8 MOTTLES; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; MODERATELY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

DEC 19, 1981

PPL MANITOBA 1980 PROFILE NO. 17

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
AP	7.1	4.86	0.33				2.0	23.3		15.5	4.4	0.2	0.4
AEJ	7.5	0.32	0.03				0.1	7.7		4.8	2.0	0.2	0.1
BMGJ	7.6	0.27	0.03					7.7		5.7	2.3	0.1	0.1
CKG1	7.7			8.3	6.1	2.0		5.4		21.6	2.7	0.1	
CKG2	7.8			7.3	3.7	3.3		1.4		7.0	0.6	0.1	

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR	WATER EXTRACT DETERMINATIONS CA	MG	NA	K	CO3	HCO3	CL	SO4	NO3
AP	1.9	52.0	14.0	8.2	0.4			1.1	5.3	1.1	
AEJ	0.5	32.0									
BMGJ	0.3	28.0									
CKG1	0.4	32.0									
CKG2	0.3	25.0									

PHYSICAL DATA (SURVEY)

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	PARTICLE SIZE ANALYSIS % OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AP							1	41	38	80		10	10	
AEJ						1	2	41	46	90		4	6	
BMGJ							2	49	38	89		4	7	
CKG1					1	1	2	37	47	88		5	7	
CKG2							2	70	26	98		2	0	

PHYSICAL DATA

SURVEY (CON'T)

MOISTURE STATUS (%)

HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST
AP	46.4	30.6	12.7		
AEJ					
BMGJ	25.0	9.0	3.5		
CKG1					
CKG2	17.9	4.6	1.1		

JUL 25, 1984

PPL MANITOBA 1983 PROFILE NO. 17

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; EXTENSIVE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED REGO DARK GRAY. MINERAL SOIL FAMILY: SANDY, CARBONATIC, ALKALINE, STRONGLY CALCAREOUS, COLD, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: PPL, ASSOCIATED SOILS: MNTAND PAN. SOIL PHASES: NEARLY LEVEL.

LOCATION: MILITARY GRID REF. 14 UPK 7055 8450; NTS MAP AREA 62H ; SW 19 6 7 E.

VEGETATION: KEY SPECIES LISTING: 1 POPULUS TREMULOIDES - TREMBLING ASPEN, 2 BETULA - BIRCH, 3 POPULUS - ASPEN. AMELANCHIER, ROSACEAE,THALITRICUM, GRASSES.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; PARENT MATERIAL 2: WEAK CHEMICAL WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: CLASS 1 (0-0.5%), FACING LEVEL, SITE AT UPPER SLOPE POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, RAPIDLY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE ABSENT, 1.2 M TO APPARENT WATERTABLE; NONSTONY; NONROCKY; PRESENT LAND USE: CROPLAND.

INTERPRETATIONS: CLI AGRICULTURE 3/MW.

SPECIAL NOTES: TAKEN ON HEADLAND. HAS SOME OVERBLOW WHICH IS DESIGNATED AN OB HORIZON. GLEYED CARBONATED REGO DARK GRAY.PROFILE CAN BE SEEN IN SAME PIT.

OB: 0 TO 10 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/1, MATRIX DRY 10YR 4.5/1; FINE SANDY LOAM; VERY WEAK, FINE TO MEDIUM, PLATY STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; PLENTIFUL, MICRO AND VERY FINE, VERTICAL AND HORIZONTAL ROOTS; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

AHK: 10 TO 20 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 4/1; FINE SANDY LOAM; MODERATE, FINE TO MEDIUM, PLATY STRUCTURE; WEAK, FINE, GRANULAR SECONDARY STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL AND HORIZONTAL ROOTS; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

BMKGJ: 20 TO 30 CM; HORIZON MOIST; MATRIX MOIST 10YR 3.5/2, MATRIX DRY 10YR 4.5/2; LOAMY FINE SAND; WEAK, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; VERY WEAK, FINE, SUBANGULAR BLOCKY SECONDARY STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; VERY FEW, FINE, VERTICAL ROOTS; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; WAVY, GRADUAL HORIZON BOUNDARY.

CCAGJ: 30 TO 45 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/2, MATRIX DRY 10YR 1/1; FINE SANDY LOAM; WEAK, FINE, GRANULAR STRUCTURE; VERY FRIABLE, SLIGHTLY PLASTIC CONSISTENCE; VERY FEW, VERTICAL ROOTS; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS; WAVY, GRADUAL HORIZON BOUNDARY.

CKG1: 45 TO 65 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/4, MATRIX DRY 10YR 1/3; FINE SAND; FEW, FINE, FAINT, 10YR 6/8 MOTTLES; 10YR 3/3 MOTTLES; VERY FRIABLE, NONPLASTIC CONSISTENCE; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

CKG2: 65 TO 100 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/6, MATRIX DRY 10YR 7/6; FINE SAND; MANY, COARSE, PROMINENT MOTTLES; VERY FRIABLE, NONPLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; MODERATELY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

2CKG: 100 TO 120 CM; MATRIX MOIST 10YR 7/1, MATRIX DRY 10YR 8/1; SILT LOAM; MANY, MEDIUM, PROMINENT MOTTLES; WEAK, MEDIUM, PLATY STRUCTURE; VERY WEAK, FINE, PLATY SECONDARY STRUCTURE PSEUDO; SLIGHTLY PLASTIC CONSISTENCE; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS.

PPL MANITOBA 1983 PROFILE NO. 17

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
OB	7.5	4.83	0.30	16.8	4.6	11.3	24.0		29.4	4.5	0.1	1.3
AHK	7.6	6.35	0.49	4.3	2.8	1.3	36.3		39.8	15.3	0.1	0.8
BMKGJ	7.7	0.53	0.06	5.4	1.2	3.9	11.2		14.8	8.0	0.1	0.5
CCAGJ	8.0			27.7	16.2	10.6	7.3		26.0	3.7	0.1	0.3
CKG1	8.1			18.3	4.6	12.7	1.6		11.7	0.6	0.1	0.2
CKG2	8.1			17.1	2.3	13.6	1.1		6.5	0.6	0.1	0.1
2CKG	7.9			26.4	10.9	14.3	6.4		13.4	2.1	0.1	0.1

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
OB	1.1	62.0
AHK	0.7	68.7
BMKGJ	0.4	31.3
CCAGJ	0.4	33.7
CKG1	0.2	28.3
CKG2	0.3	22.3
2CKG	0.2	31.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
OB						1	3	32	30	66		31	3	
AHK						2	5	45	27	79		9	12	
BMKGJ						2	6	40	37	85		6	9	
CCAGJ					1	3	6	39	27	76		8	16	
CKG1					1	3	5	43	44	96		2	2	
CKG2					5	7	18	47	19	96		3	1	
2CKG					1	1	1	1	14	18		74	8	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
OB								
AHK								
BMKGJ								
CCAGJ								
CKG1								
CKG2								
2CKG	20.0	22.0	21.0			8.0	40	09

JUL 25, 1984

PRG MANITOBA 1983 PROFILE NO. 13

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ELUVIATED EUTRIC BRUNISOL. MINERAL SOIL FAMILY: SANDY, COLD, SEMIARID. SOIL MAP UNIT: NOTATION: PRG, ASSOCIATED SOILS: HOG.

LOCATION: MILITARY GRID REF. 14 UPK 8900 8234; NTS MAP AREA 62H ; SW 12 6 8 E.

VEGETATION: KEY SPECIES LISTING: 1 PINUS BANKSIANA - JACK PINE. ARCTOSTAPHYLOS UVA URSI, ROSACEAE, GRASSES, ODD CROCUS.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SANDY, GLACIOLACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, RIDGED; SLOPE: 5% SIMPLE SLOPE OF CLASS 3 (2-5%), FACING EAST, SITE AT UPPER SLOPE POSITION, 100 M LONG; SOIL MOISTURE AND DRAINAGE: SEMIARID, RAPIDLY DRAINED, RAPIDLY PERVIOUS, RAPID SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; NONROCKY; PRESENT LAND USE: UNPRODUCTIVE WOODLAND.

INTERPRETATIONS: CLI AGRICULTURE 6/M.

SPECIAL NOTES: NOT FARMED TO DRY. USED AS A NATURAL AREA

LH: 2 TO 0 CM; HORIZON MOIST; 10YR 3/1, MATRIX DRY 10YR 4/1; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, FINE, VERTICAL AND HORIZONTAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

AE: 0 TO 35 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/4, MATRIX DRY 10YR 6/3; SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, FINE, VERTICAL AND HORIZONTAL ROOTS; WAVY, GRADUAL HORIZON BOUNDARY.

BM1: 35 TO 47 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/6, MATRIX DRY 10YR 6/4; SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, FINE, VERTICAL AND HORIZONTAL ROOTS; WAVY, GRADUAL HORIZON BOUNDARY.

BM2: 47 TO 52 CM; HORIZON MOIST; MATRIX MOIST 7.5YR 5/6, MATRIX DRY 10YR 5/6; SAND; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; 10% GRAVELLY COARSE FRAGMENTS; WAVY, ABRUPT HORIZON BOUNDARY.

CK: 52 TO 110 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 7/2; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; WEAKLY CALCAREOUS.

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
								BUFF.	PERM. CHARG	CA	MG	NA	K
LH	6.1	13.68	0.55				7.8	35.7		21.0	5.4	0.1	1.2
AE	6.1	0.13	0.10					2.7		1.4	0.5		0.2
BM1	6.5	0.14	0.10					3.6		2.5	0.8		0.3
BM2	7.3			7.5	0.5	6.5		5.3		0.0	1.1		0.3
CK	7.7			6.7	1.7	4.6		0.8		6.3	0.3		0.2

JUL 25, 1984

PRG MANITOBA 1983 PROFILE NO. 13

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH	0.2	84.9
AE	0.1	24.7
BM1	0.1	23.8
BM2	0.3	26.7
CK	0.1	28.6

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING				% OF SAMPLE									
	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AE			99	98	1	8	24	56	7	96		2	2	
BM1			98	94	3	15	27	42	8	95		2	3	
BM2		96	85	82	6	16	25	40	3	90		5	5	
CK		96	93	93		2	15	80	2	99		0	1	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AE								
BM1								
BM2								
CK							30	06

DEC 19, 1981

RTV MANITOBA 1980 PROFILE NO. 11

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, MINERAL SOIL FAMILY: COOL, SUBAQUIC. ORGANIC SOIL FAMILY: MESIC, SANDY, DYSIC, PERHUMID, SANDY. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: RTV, ASSOCIATED SOILS: KIC.

LOCATION: MILITARY GRID REF. 14 UPK 9275 5615; NTS MAP AREA 62H ; NE 19 3 9 E.

VEGETATION: FOREST,MIXED, REGENERATING. KEY SPECIES LISTING: 1 PICEA MARIANA - BLACK SPRUCE, 2 LARIX - TAMARACK, 3 SALIX - WILLOW. ALNUS, BEPY, CR,RIBES, VACCINIUM ANGUSTAFOLIUM, LEDUM GROENLANDICUM, RUBUS, CC.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), ORGANIC, A429; PARENT MATERIAL 2: WEAK CHEMICAL WEATHERING, SANDY, WEAKLY CALCAREOUS (1 TO 6% CACO3), LACUSTRINE, MIXED; ORGANIC DEPOSIT IS 1.3 M; LANDFORM CLASSIFICATION: BOG, MESIC AND HUMIC, BOWLED; SLOPE: COMPLEX SLOPE OF CLASS 2 (0.5-2%), MODERATELY MOUNDED MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: PERHUMID, IMPERFECTLY DRAINED, SLOWLY PERVIOUS, VERY SLOW SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; PRESENT LAND USE: BOG.

INTERPRETATIONS: CLI AGRICULTURE 7/W.

OF: 0 TO 20 CM; HORIZON DRY; MATRIX MOIST 2.5YR 2/4; MATERIAL COMPOSITION 20 AND 10 AND 70% FEATHERMOSS AND HERBACEOUS FRAGMENTS AND WOOD FRAGMENTS, SLIGHT DECOMPOSITION; >50% BY VOLUME; ORGANIC; SOFT, NONPLASTIC CONSISTENCE; MODERATELY POROUS; SLIGHTLY ACID 6.1-6.5 FIELD PH.

OM: 20 TO 80 CM; HORIZON MOIST; MATRIX MOIST 2.5YR 2/2; MATERIAL COMPOSITION 20 AND 10 AND 70% FEATHERMOSS AND HERBACEOUS FRAGMENTS AND WOOD FRAGMENTS, MODERATE DECOMPOSITION; 20-50% BY VOLUME; ORGANIC; VERY FRIABLE, NONPLASTIC CONSISTENCE; SLIGHTLY POROUS; SLIGHTLY ACID 6.1-6.5 FIELD PH.

OH1: 80 TO 90 CM; HORIZON MOIST; MATRIX MOIST 5YR 2/1; MATERIAL COMPOSITION HIGH DECOMPOSITION; ORGANIC; FRIABLE, NONPLASTIC CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

OH2: 90 TO 100 CM; HORIZON MOIST; MATRIX MOIST 2.5YR 3/2; MATERIAL COMPOSITION HIGH DECOMPOSITION; ORGANIC; FIRM, NONPLASTIC CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

OH3: 100 TO 130 CM; HORIZON MOIST; MATRIX MOIST 5YR 2/1; MATERIAL COMPOSITION HIGH DECOMPOSITION; ORGANIC; FIRM, NONPLASTIC CONSISTENCE; SLIGHTLY POROUS; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

2CKG: 130 TO 160 CM; HORIZON WET; MATRIX MOIST 5Y 6/1; SAND; FRIABLE, NONPLASTIC CONSISTENCE; SLIGHTLY POROUS; VERY WEAK EFFERVESCENCE; WEAKLY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

RTV MANITOBA 1980 PROFILE NO. 11

DEC 19, 1981

CHEMICAL DATA (SURVEY)

HORIZON	ORG C (%)	PYRO EXTR C-%	TOTAL N (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
OF	46.51	99.9	1.36	37.6	174.2		148.0	20.5	0.1	0.1
OM	55.50	99.9	1.72	21.5	196.2		144.5	20.5	0.3	0.3
OH1	24.81	64.5	1.90	8.9	116.0		93.0	10.3	0.1	0.1
OH2	16.62	19.2	1.30	8.5	57.6		47.7	5.1	0.1	0.1
OH3	28.83	71.0	1.92	18.1	113.8		75.2	12.3	0.1	0.1
2CKG										

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	RUB FIB %	UNRUB FIBRE %	% ASH	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
OF	54	86	21														
OM	42	70	11														
OH1	12	24	55														
OH2	4	16	73														
OH3	6	22	50														
2CKG							97	8	27	29	34	1	99		1	0	

JUL 25, 1984

SDI MANITOBA 1983 PROFILE NO. 12

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; EXTENSIVE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ELUVIATED DYSTRIC BRUNISOL. MINERAL SOIL FAMILY: SANDY, COLD, SUBHUMID. SOIL MAP UNIT: NOTATION: SDI, ASSOCIATED SOILS: LSDAND MNT.

LOCATION: MILITARY GRID REF. 14 UPK 8025 8050; NTS MAP AREA 62H ; SE 2 6 8 E.

VEGETATION: KEY SPECIES LISTING: 1 PINUS BANKSIANA - JACK PINE. CLADONIA, LICHENS, GRASSES, MOSSES.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), GLACIOLACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, UNDULATING; SLOPE: CLASS 2 (0.5-2%), FACING LEVEL, SITE AT CREST POSITION, 60 M LONG; SOIL MOISTURE AND DRAINAGE: SUBHUMID, WELL DRAINED, RAPIDLY PERVICUS, SEEPAGE ABSENT; NONSTONY; NONROCKY.

SPECIAL NOTES: ANY AREA WITH CLEARING HAS BLOWOUTS

LH: 2 TO 0 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/1, MATRIX DRY 10YR 4/1; MATERIAL COMPOSITION 40 AND 40 AND 20% NEEDLES AND FEATHERMOSS AND HERBACEOUS FRAGMENTS; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, HORIZONTAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

AE: 0 TO 15 CM; HORIZON MOIST; MATRIX MOIST 10YR 4.5/3, MATRIX DRY 10YR 6/3; FINE SAND; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, HORIZONTAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

BMGJ: 15 TO 85 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/6, MATRIX DRY 10YR 6/4; FINE SAND; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, FINE, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

CKGJ: 85 TO 115 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 8/2; FINE SAND; MANY, MEDIUM, DISTINCT, 7.5YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; VERY FRIABLE, NONPLASTIC CONSISTENCE; .

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LH	5.3	5.78	0.34	0.0	4.1	16.1		8.8	2.1	0.1	0.9
AE	5.3	0.50	0.02	0.0	1.2	4.6		2.2	0.5	0.1	0.5
BMGJ	5.6	0.07	0.01	0.0	1.0	2.4		1.2	0.2	0.2	
CKGJ	5.9			0.0		2.8		1.7	0.5	0.1	

SDI MANITOBA 1983 PROFILE NO. 12

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LH	0.3	65.9
AE	0.1	30.8
BMGJ	0.1	29.1
CKGJ	0.1	24.6

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING				% OF SAMPLE									
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LH														
AE						1	10	49	35	95		3	2	
BMGJ						2	18	56	20	96		2	2	
CKGJ						1	9	40	47	97		1	2	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LH								
AE								
BMGJ								
CKGJ							24	07

JUL 25, 1984

SDI MANITOBA 1983 PROFILE NO. 23

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ELUVIATED DYSTRIC BRUNISOL. MINERAL SOIL FAMILY: SANDY, MIXED NONCLAY, ACID, COOL, SEMIARID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: SDI, ASSOCIATED SOILS: LSDAND PAN.

LOCATION: MILITARY GRID REF. 14 UPK 8695 7880; NTS MAP AREA 62H ; SE 34 5 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 14 DEG(C) AT 20 CM IN JUNE, NO. 2 WAS 10 DEG(C) AT 50 CM IN JUNE, NO. 3 WAS 6 DEG(C) AT 100 CM IN JUNE.

VEGETATION: FOREST,SOFTWOOD, REGENERATING. KEY SPECIES LISTING: 1 PINUS BANKSIANA - JACK PINE, 2 VACCINIUM - BLUEBERRY,HUCKLEBERRY, ETC.. BEARBERRY,ANTENNARIA,GRASSES, ROSACEAE, CLADONIA, FEW SASKATOON AND SMALL POBA.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, SANDY, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), LACUSTRINE, MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: 0.5% SIMPLE SLOPE OF CLASS 1 (0-0.5%), FACING LEVEL; SOIL MOISTURE AND DRAINAGE: SEMIARID, WELL DRAINED, RAPIDLY PERVIOUS, MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; NONROCKY; PRESENT LAND USE: PRODUCTIVE WOODLAND.

INTERPRETATIONS: CLI AGRICULTURE 5/M.

SPECIAL NOTES: ODD SMALL PINCHERRY

LFH: 2 TO 0 CM, RANGE 2 TO 3 CM; HORIZON DRY; MATRIX MOIST , MATRIX DRY 10YR 3/1; MATERIAL COMPOSITION 20% NEEDLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; SMOOTH, ABRUPT HORIZON BOUNDARY.

AE: 0 TO 7 CM, RANGE 5 TO 10 CM; HORIZON DRY; MATRIX MOIST 10YR 5/2, MATRIX DRY 10YR 6/2; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; ABUNDANT, MICRO AND FINE AND COARSE, VERTICAL AND HORIZONTAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

BM: 7 TO 45 CM, RANGE 38 TO 45 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/8, MATRIX DRY 10YR 6/6; FINE SAND; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; PLENTIFUL, MICRO AND FINE AND COARSE, VERTICAL AND HORIZONTAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY.

CGJ1: 45 TO 100 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 8/3; FINE SAND; FEW, COARSE, PROMINENT, 10YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; .

CGJ2: 100 TO 130 CM; HORIZON MOIST; MATRIX MOIST 10YR 6.5/3, MATRIX DRY 10YR 7/2; FINE SAND; FEW, COARSE, PROMINENT, 10YR 5/8 MOTTLES; STRUCTURELESS STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; .

SDI MANITOBA 1983 PROFILE NO. 23

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
LFH	5.7	4.05	0.56	5.0	22.0		10.5	2.5		0.6
AE	5.4	0.92	0.05	3.6	7.0		2.4	0.6		0.1
BM	5.5	0.14	0.01	1.6	2.8		0.8	0.3		0.1
CGJ1	5.6			0.7	1.7		0.6	0.2		
CGJ2	5.7			0.4	1.4		1.5	0.2		

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
LFH	0.2	75.0
AE	0.1	39.1
BM	0.1	31.8
CGJ1	0.1	31.9
CGJ2	0.1	30.4

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
LFH														
AE						1	3	70	19	93		4	3	
BM						2	4	76	14	96		2	2	
CGJ1							2	69	26	97		1	2	
CGJ2						1	4	77	16	98			2	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
LFH								
AE								
BM								
CGJ1								
CGJ2							30	07

JUL 25, 1984

SCY MANITOBA 1983 PROFILE NO. 16

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; EXTENSIVE.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED BLACK. MINERAL SOIL FAMILY: CLAYEY, MONTMORILLONITIC, ALKALINE, STRONGLY CALCAREOUS, COLD, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: SCY, ASSOCIATED SOILS: MRSAND RIV. SOIL PHASES: LEVEL.

LOCATION: MILITARY GRID REF. 14 UPK 7135 130; NTS MAP AREA 62H ; NE 7 7 7 E.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, CLAYEY (>35% CLAY), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, UNDIFFERENTIATED OR UNDETERMINED; LANDFORM CLASSIFICATION: LACUSTRINE, CLAYEY, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%), FACING LEVEL, SITE AT DEPRESSION POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, SLOWLY PERVIOUS, VERY SLOW SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; NONROCKY; PRESENT LAND USE: CROPLAND.

AP: 0 TO 15 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 3/2; HEAVY CLAY; STRUCTURELESS, MASSIVE STRUCTURE; FIRM, EXTREMELY HARD, VERY PLASTIC CONSISTENCE; .

BMGJ: 15 TO 25 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 3/2, MATRIX DRY 2.5Y 3/2; HEAVY CLAY; MODERATE, MEDIUM TO COARSE, SUBANGULAR BLOCKY STRUCTURE; WEAK, FINE TO MEDIUM, SUBANGULAR BLOCKY SECONDARY STRUCTURE; FRIABLE, VERY PLASTIC CONSISTENCE; .

BC: 25 TO 40 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 3/2; HEAVY CLAY; WEAK, FINE, GRANULAR STRUCTURE; VERY FRIABLE, VERY PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS.

CKG: 40 TO 85 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 4/2, MATRIX DRY 5Y 5/1; HEAVY CLAY; WEAK, FINE, GRANULAR STRUCTURE; VERY FRIABLE, VERY PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS.

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	EXCHANGEABLE CATIONS BUFFERED (ME/100G) MG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) NA	EXCHANGEABLE CATIONS BUFFERED (ME/100G) K
AP	6.5	3.78	0.26				7.9	57.0		19.0	21.6	0.8	1.6
BMGJ	7.4	1.72	0.12					61.3		21.5	27.1	1.4	1.5
BC	8.0	1.40	0.15	15.1	13.4	1.5		47.2		27.5	23.6	1.6	1.3
CKG	8.0			16.6	13.1	3.2		50.1		23.0	27.4	3.0	1.1

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
AP	0.3	78.8
BMGJ	0.7	93.9
BC	0.8	80.4
CKG	1.0	96.2

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING				% OF SAMPLE									
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AP						1	3	4	16	24		15	61	
BMGJ						1	1	2	12	16		12	72	
BC							1	2	12	15		12	73	
CKG										9		12	79	

PHYSICAL DATA

	SURVEY (CON'T)					ENGINEERING								
	MOISTURE STATUS (%)													
HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
AP			25.6										
BMGJ			28.7			34.0	77.0	11.0			31.0	75	13
BC													
CKG			20.6			32.0	75.0	15.0			31.0	75	13

JUL 25, 1984

SCY MANITOBA 1983 PROFILE NO. 19

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED SOLONETZIC BLACK. MINERAL SOIL FAMILY: CLAYEY, MONTMORILLONITIC, ALKALINE, STRONGLY CALCAREOUS, COLD, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: SCY, ASSOCIATED SOILS: MRSAND RIV.

LOCATION: MILITARY GRID REF. 14 UPL 7047 177; NTS MAP AREA 62H ; NW 7 8 7 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 16 DEG(C) AT 20 CM IN MAY, NO. 2 WAS 8 DEG(C) AT 50 CM IN MAY, NO. 3 WAS 4 DEG(C) AT 100 CM IN MAY.

SOIL SITE: PARENT MATERIAL 1: WEAK CHEMICAL WEATHERING, CLAYEY (>35% CLAY), MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE; LANDFORM CLASSIFICATION: LACUSTRINE, CLAYEY, LEVEL; SLOPE: CLASS 1 (0-0.5%), FACING LEVEL, SITE AT CREST POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, SLOWLY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; NONROCKY; PRESENT LAND USE: CROPLAND.

INTERPRETATIONS: CLI AGRICULTURE 3/W.

SPECIAL NOTES: TONGUING EXHIBITED HERE, SLICKENSIDE ALSO PRESENT.

AP: 0 TO 20 CM; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 3/1; HEAVY CLAY; WEAK TO MODERATE, MEDIUM TO COARSE, SUBANGULAR BLOCKY STRUCTURE; MODERATE, FINE, SUBANGULAR BLOCKY SECONDARY STRUCTURE; VERY STICKY, FRIABLE, VERY PLASTIC CONSISTENCE; WAVY, CLEAR HORIZON BOUNDARY.

BMGJ: 20 TO 30 CM; MATRIX MOIST 10YR 2/1, MATRIX DRY 10YR 3/1; HEAVY CLAY; MODERATE, FINE, COLUMNAR STRUCTURE; MODERATE, FINE, SUBANGULAR BLOCKY SECONDARY STRUCTURE; VERY STICKY, FIRM, VERY PLASTIC CONSISTENCE; IRREGULAR, GRADUAL HORIZON BOUNDARY.

BC: 30 TO 50 CM; MATRIX MOIST 10YR 3/1, MATRIX DRY ; HEAVY CLAY; WEAK, MEDIUM, ANGULAR BLOCKY STRUCTURE; WEAK, FINE, GRANULAR SECONDARY STRUCTURE; VERY STICKY, FIRM, VERY PLASTIC CONSISTENCE; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

CKGJ1: 50 TO 90 CM; MATRIX MOIST 2.5Y 3/2, MATRIX DRY 5Y 5/1; HEAVY CLAY; MODERATE, MEDIUM TO COARSE, ANGULAR BLOCKY STRUCTURE; MODERATE TO STRONG, FINE, GRANULAR SECONDARY STRUCTURE; FIRM, VERY PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY.

CKGJ2: 90 TO 100 CM; MATRIX MOIST 2.5Y 4/2, MATRIX DRY 2.5Y 5.5/2; HEAVY CLAY; VERY WEAK, FINE, GRANULAR STRUCTURE; FRIABLE, VERY PLASTIC CONSISTENCE; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS.

CHEMICAL DATA (SURVEY)

								C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	BUFF.	PERM. CHARG	CA	MG	NA	K
AP	6.6	4.43	0.37				9.4	63.4		18.5	26.4	1.1	1.6
BMGJ	6.9	4.24	0.32				8.0	66.6		18.8	29.0	1.7	1.6
BC	7.8	1.90	0.18	4.8	3.2	1.5		62.0		23.0	32.7	2.4	1.3
CKGJ1	8.1			15.7	13.0	2.5		52.1		21.5	30.3	4.5	1.2
CKGJ2	8.1			6.8	2.6	3.9		55.3		24.7	28.8	6.4	1.7

JUL 25, 1984

SCY MANITOBA 1983 PROFILE NO. 19

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
AP	0.8	82.3
BMGJ	0.4	83.0
BC	0.7	85.8
CKGJ1	1.3	87.0
CKGJ2	4.7	94.5

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING									% OF SAMPLE				
HORIZON	3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AP						1	2	2	7	12		18	70	
BMGJ					1	1	2	1	7	12		15	73	
BC										9		10	81	
CKGJ1										6		11	83	
CKGJ2										1		8	91	

PHYSICAL DATA

	SURVEY (CON'T) MOISTURE STATUS (%)					ENGINEERING							
HORIZON	0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
AP			27.0										
BMGJ			27.9										
BC			23.0			37.0	86.0	17.0			29.0	75	13
CKGJ1													
CKGJ2			23.4			32.0	89.0	14.0			31.0	75	13

DEC 19, 1981

SPG MANITOBA 1980 PROFILE NO. 19

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: REGO HUMIC GLEYSOL. MINERAL SOIL FAMILY: SANDY/LOAMY, CARBONATIC, ALKALINE, EXTREMELY CALCAREOUS, COOL, AQUIC. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: SPG, ASSOCIATED SOILS: PLN. SOIL PHASES: LEVEL AND MODERATELY STONY.

LOCATION: MILITARY GRID REF. 14 UFK 6159 5162; NTS MAP AREA 62H 2; NW 7 3 6 E.

VEGETATION: SEDGE-RUSH, UNDISTURBED. KEY SPECIES LISTING: 1 CAREX - SEDGES, 2 TYPHA LATIFOLIA - CAT-TAIL. ODD SALIX,FEW PHRAGMITES.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE, MIXED; PARENT MATERIAL 2: UNSPECIFIED WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), MORAINAL (TILL), MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: SIMPLE SLOPE OF CLASS 1 (0-0.5%), SITE AT DEPRESSION POSITION; SOIL MOISTURE AND DRAINAGE: SUBAQUIC, POORLY DRAINED, MODERATELY PERVIOUS AND SLOWLY PERVIOUS, VERY SLOW AND PONDED SURFACE RUNOFF, SEEPAGE ABSENT; MODERATELY STONY; PRESENT LAND USE: MARSH AND FEN.

INTERPRETATIONS: CLI AGRICULTURE 5/W.

SPECIAL NOTES: MINT. UNUSUALLY DRY YEAR, BURNT OVER THIS SPRING AND IN OTHER YEARS, ASH IN OH

OH: 5 TO 0 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/3, MATRIX DRY 10YR 3/1; MATERIAL COMPOSITION 20 AND 50% FEATHERMOSS AND SEDGE AND REED, MODERATE AND HIGH DECOMPOSITION; ASHY ORGANIC; FEW, MICRO, VERTICAL ROOTS; SMOOTH, CLEAR HORIZON BOUNDARY.

AHK: 0 TO 7 CM; HORIZON MOIST; MATRIX MOIST 10YR 2.5/1, MATRIX DRY 10YR 3/1; LOAMY SAND; WEAK TO MODERATE, FINE TO MEDIUM, GRANULAR STRUCTURE; FRIABLE CONSISTENCE; FEW, MICRO, VERTICAL ROOTS; VERY WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; IRREGULAR, GRADUAL HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

BMKG: 7 TO 25 CM; HORIZON MOIST; MATRIX MOIST 10YR 3.5/2, MATRIX DRY 10YR 5/3; LOAMY SAND; WEAK, FINE TO MEDIUM STRUCTURE; FRIABLE CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; IRREGULAR, GRADUAL HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CCAG: 25 TO 40 CM; HORIZON MOIST; MATRIX MOIST 10YR 5/3, MATRIX DRY 10YR 6/3; COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CKG: 40 TO 50 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/3, MATRIX DRY 10YR 7/3; SAND; STRUCTURELESS STRUCTURE; LOOSE CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; WAVY, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

2CKG1: 50 TO 85 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 3/3; GRITTY FINE SANDY LOAM; COMMON, MEDIUM, DISTINCT, 7.5YR 5/8 MOTTLES; WEAK, FINE TO MEDIUM, PLATY STRUCTURE PSEUDO; FRIABLE CONSISTENCE; FEW, MICRO, VERTICAL ROOTS; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; IRREGULAR, GRADUAL HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

2CKG2: 85 TO 100 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 3/3; GRITTY FINE SANDY LOAM; COMMON, FINE, FAINT MOTTLES; 10YR 6/8 MOTTLES; MODERATE, MEDIUM TO COARSE, PLATY STRUCTURE PSEUDO; FRIABLE CONSISTENCE; MICRO, VERTICAL ROOTS; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 10% ANGULAR GRAVELLY COARSE FRAGMENTS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

DEC 19, 1981

SPG MANITOBA 1980 PROFILE NO. 19

CHEMICAL DATA (SURVEY)

									C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	PYRO EXTR C-%	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	BUFF.	PERM. CHARG	CA	MG	NA	K
OH	7.4	6.60	33.4	0.62				1.0	36.9		45.5	11.1	0.2	1.0
AHK	7.6	1.94		0.15	6.9	0.0	6.3		14.8		12.6	4.1	0.2	0.1
BMKG	7.5	0.46		0.04	15.4	1.5	12.8				10.8	1.5	0.2	0.1
CCAG	7.5				18.2	2.9	14.1				5.7	0.7	0.2	
CKG	7.4				9.9	1.2	8.0				1.9	0.1	0.1	
2CKG1	7.6				36.8	7.1	27.4				14.4	1.6	0.1	0.1
2CKG2	7.6				38.7	14.6	22.2				15.9	1.8	0.2	0.1

CHEMICAL DATA (SURVEY)

			WATER EXTRACT DETERMINATIONS								
HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR	CA	MG	NA	K	CO3	HCO3	CL	SO4	NO3
OH	2.7	92.0	31.9	23.0	2.2			2.6	1.4	50.1	
AHK	2.8	32.0	28.0	20.6	2.2			1.3	0.5	47.8	
BMKG	1.9	20.0	19.2	9.9	1.3			1.5	1.9	26.2	
CCAG	1.4	21.0									
CKG	0.7	24.0									
2CKG1	2.5	20.0	23.3	18.9	1.7			2.0	0.7	41.1	
2CKG2	1.4	25.0									

SPG MANITOBA 1980 PROFILE NO. 19

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING									% OF SAMPLE				
HORIZON	3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
OH														
AHK					2	14	26	24	13	78		13	9	
BMKG					3	17	27	26	12	85		10	5	
CCAG				83	13	25	29	19	7	93		5	2	
CKG					2	14	45	31	4	96		4	0	
2CKG1				83	5	7	12	19	20	63		30	7	
2CKG2				93	3	4	10	21	17	55		34	11	

PHYSICAL DATA

ENGINEERING

HORIZON	ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
OH								
AHK								
BMKG								
CCAG								
CKG								
2CKG1								
2CKG2	12.0	14.0	13.8				40	09

JUL 25, 1984

SPG MANITOBA 1982 PROFILE NO. 18

IDENTIFICATION: SURVEYED BY WM, FOR THE PURPOSE OF RESEARCH SITE; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: REGO HUMIC GLEYSOL. MINERAL SOIL FAMILY: SANDY/LOAMY, MIXED NONCLAY, ALKALINE, STRONGLY CALCAREOUS, COLD, AQUIC. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: SPG, ASSOCIATED SOILS: MNTAND PPL.

LOCATION: MILITARY GRID REF. 14 UPK 7430 8263; NTS MAP AREA 62H ; SW 16 6 7 E.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), LACUSTRINE; PARENT MATERIAL 2: COARSE LOAMY AND COARSE SILTY (<18% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), MORAINAL (TILL); SLOPE: 0.1% SIMPLE SLOPE OF CLASS 1 (0-0.5%), SITE AT TOE POSITION, SLIGHTLY MOUNDED MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: AQUIC, POORLY DRAINED, MODERATELY PERVIOUS, VERY SLOW SURFACE RUNOFF; SLIGHTLY STONY.

INTERPRETATIONS: CLI AGRICULTURE 4/W.

APK: 0 TO 11 CM; HORIZON MOIST; MATRIX MOIST 5YR 2.5/2; MUCKY FINE SANDY LOAM; VERY WEAK AND MODERATE, FINE, GRANULAR STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; PLENTIFUL, VERY FINE, RANDOM ROOTS; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

AHK: 11 TO 14 CM; HORIZON MOIST; MATRIX MOIST 10YR 2/1.5; FINE SANDY LOAM; WEAK AND MODERATE, FINE, PLATY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; SLIGHTLY POROUS, FEW, VERY FINE, VERTICAL, VESICULAR PORES; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

ACAGJ: 14 TO 28 CM; HORIZON MOIST; MATRIX MOIST 5Y 5/1.5; VERY FINE SANDY LOAM; FEW, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; STRUCTURELESS STRUCTURE; WEAK, FINE, PLATY SECONDARY STRUCTURE; FRIABLE, NONPLASTIC AND SLIGHTLY PLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL ROOTS; SLIGHTLY POROUS, FEW, VERY FINE, VERTICAL, VESICULAR PORES; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, CLEAR HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ1: 28 TO 45 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 7/3; FINE SAND; FEW, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL ROOTS; HIGHLY POROUS, FEW, VERY FINE, VESICULAR PORES; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, GRADUAL HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ2: 45 TO 59 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 7/3; VERY FINE SAND; FEW, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL ROOTS; HIGHLY POROUS, FEW, VERY FINE, VESICULAR PORES; MODERATE EFFERVESCENCE; STRONGLY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

CKGJ3: 59 TO 61 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 7/6; COARSE SAND; COMMON, FINE, DISTINCT, 10YR 5/6 MOTTLES; STRUCTURELESS, SINGLE GRAIN STRUCTURE; LOOSE, NONPLASTIC CONSISTENCE; FEW, VERY FINE, HORIZONTAL ROOTS; HIGHLY POROUS; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; SMOOTH, ABRUPT HORIZON BOUNDARY; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

2CKGJ1: 61 TO 90 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 6/4; GRITTY VERY FINE SANDY LOAM; COMMON, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; MEDIUM, PLATY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; VERY FEW, VERY FINE, VERTICAL ROOTS; SLIGHTLY POROUS; STRONG EFFERVESCENCE; VERY STRONGLY CALCAREOUS; 10% GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

2CKGJ2: 90 TO 120 CM; HORIZON MOIST; MATRIX MOIST 2.5Y 6/4; GRITTY LOAM; COMMON, MEDIUM, PROMINENT, 10YR 5/6 MOTTLES; MEDIUM, PLATY STRUCTURE; FRIABLE, NONPLASTIC CONSISTENCE; SLIGHTLY POROUS; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 20% GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

SPG MANITOBA 1982 PROFILE NO. 18

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
APK	7.7	13.00	0.71	10.9	5.3	5.2	5.4	47.8		33.0	7.7	0.4	0.4
AHK	7.8	5.60	0.38	12.5	4.7	7.2		31.3		28.8	6.1	0.2	0.2
ACAGJ	7.9	0.60	8.27	11.6	10.2			6.7		19.1	2.5	0.1	0.2
CKGJ1	7.9			11.3	2.7	7.9		1.3		7.5	0.5	0.1	0.3
CKGJ2	7.9			14.2	4.3	9.1		1.5		7.2	0.5	0.1	0.2
CKGJ3													
2CKGJ1	7.8			34.7	11.1	21.9		2.6		17.0	1.5	0.1	0.2
2CKGJ2	7.9			41.0	11.1	27.6		2.3		17.5	1.5	0.1	0.2

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
APK	1.3	114.2
AHK	0.8	62.6
ACAGJ	0.4	31.3
CKGJ1	0.3	28.3
CKGJ2	0.4	26.9
CKGJ3		
2CKGJ1	0.7	24.0
2CKGJ2	0.5	22.0

JUL 25, 1984

SPG MANITOBA 1982 PROFILE NO. 18

PHYSICAL DATA (SURVEY)

HORIZON	% PASSING 3 SIEVE	.75 SIEVE	NO.4 SIEVE	NO.10 SIEVE	PARTICLE SIZE ANALYSIS V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	% OF SAMPLE 70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY	BULK DENS G/CC
APK				99	1	3	8	35	22	69		15	16		0.58
AHK				99		3	6	44	25	78		9	13		1.17
ACAGJ				99		3	5	33	37	78		9	13		1.70
CKGJ1				99	1	1	3	54	38	97		2	1		1.66
CKGJ2				99		1	2	36	55	94		5	1		1.68
CKGJ3															
2CKGJ1		99	96	94	1	2	3	12	38	56		37	7		1.87
2CKGJ2		96	91	89	1	4	6	14	26	51		40	9		2.00

PHYSICAL DATA

HORIZON	SURVEY (CON'T) MOISTURE STATUS (%) 0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ATTERBURG PLASTIC LIMIT (%)	ENGINEERING ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
APK													
AHK			12.4										
ACAGJ			6.4			16.0	18.0	20.0				24	07
CKGJ1			1.1										
CKGJ2												24	07
CKGJ3													
2CKGJ1						13.0	14.0	23.0					
2CKGJ2												40	09

SPG MANITOBA 1982 PROFILE NO. 18

JUL 25, 1984

SPECIAL ANALYTICAL DATA

HORIZON	INFILTRATION RATE, STEADY STATE (CM/HR)	SATURATED. HYDRAULIC CONDUCTIVITY (CM/HR)
APK		
AHK		0.2
ACAGJ		0.2
CKGJ1		
CKGJ2		5.5
CKGJ3		
2CKGJ1		0.1
2CKGJ2		

NOV 08, 1984

STD MANITOBA 1981 PROFILE NO. 66

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: TYPIC MESISOL. ORGANIC SOIL FAMILY: MESIC, EUIC, COOL, PERAQUIC, LOAMY. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: STD, ASSOCIATED SOILS: KICAND CAY.

LOCATION: MILITARY GRID REF. 14 UNL 8207 9826; NTS MAP AREA 62H ; SE 31 7 8 E.

VEGETATION: SEDGE-RUSH, UNDISTURBED. KEY SPECIES LISTING: 1 CAREX - SEDGES. DREPANOCLADUS.

SOIL SITE: PARENT MATERIAL 1: CHEMICAL AND PHYSICAL WEATHERING, MEDIUM ACID TO NEUTRAL (PH 5.6-7.3), ORGANIC, A430; PARENT MATERIAL 2: WEAK CHEMICAL WEATHERING, FINE LOAMY AND FINE SILTY (18 TO 35% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), LACUSTRINE; LANDFORM CLASSIFICATION: FEN, HORIZONTAL; SLOPE: CLASS 1 (0-0.5%), FACING LEVEL, SITE AT DEFRESSION POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: AQUIC, VERY POORLY DRAINED, MODERATELY PERVIOUS, PONDED SURFACE RUNOFF, SEEPAGE PRESENT, 0 M TO APPARENT WATERTABLE; NONSTONY; NONROCKY; PRESENT LAND USE: FEN.

OF: 0 TO 20 CM; HORIZON WET; MATRIX MOIST 7.5YR 2/0, MATRIX DRY 10YR 3/2; MATERIAL COMPOSITION 50 AND 10 AND 40% SEDGE AND REED AND HERBACEOUS FRAGMENTS AND FEATHERMOSS, SLIGHT DECOMPOSITION; SLIGHTLY STICKY CONSISTENCE; IRREGULAR, GRADUAL HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

OM1: 20 TO 100 CM; HORIZON WET; MATRIX MOIST 10YR 3/2, MATRIX DRY 10YR 4/3; MATERIAL COMPOSITION 50 AND 10 AND 40% SEDGE AND REED AND HERBACEOUS FRAGMENTS AND FEATHERMOSS, MODERATE DECOMPOSITION; SLIGHTLY STICKY CONSISTENCE; IRREGULAR, GRADUAL HORIZON BOUNDARY; SLIGHTLY ACID 6.1-6.5 FIELD PH.

OM2: 100 TO 220 CM; HORIZON WET; MATRIX MOIST 10YR 2/2, MATRIX DRY 10YR 4/3; MATERIAL COMPOSITION 50 AND 10 AND 40% SEDGE AND REED AND HERBACEOUS FRAGMENTS AND FEATHERMOSS, MODERATE DECOMPOSITION; SLIGHTLY STICKY CONSISTENCE; SMOOTH, ABRUPT HORIZON BOUNDARY; SLIGHTLY ACID 6.1-6.5 FIELD PH.

2CKG: 220 TO 250 CM; HORIZON MOIST; MATRIX MOIST N 7; FINE SANDY CLAY LOAM; MASSIVE STRUCTURE; FIRM CONSISTENCE; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	PYRO EXTR C-%	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
OF	6.7	58.99	11.9	2.79				21.2	102.8		65.7	13.2	0.8	0.4
OM1	6.2	62.07	7.0	2.53				32.7	121.6		69.5	15.4	0.5	0.2
OM2	6.1	61.49	18.2	2.65				41.8	126.8		70.4	21.0	0.5	0.1
2CKG	7.5				38.5	21.2	16.0		9.4		22.7	6.5	0.1	0.1

NOV 08, 1984

STD MANITOBA 1981 PROFILE NO. 66

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
OF		
OM1		
OM2		
2CKG		
	0.7	39.6

PHYSICAL DATA (SURVEY)

				PARTICLE SIZE ANALYSIS													
				% PASSING										% OF SAMPLE			
HORIZON	RUB FIB %	UNRUB FIBRE %	% ASH	3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
OF	60	60	8														
OM1	36	48	7														
OM2	40	60	8														
2CKG																	
								0	0	2	36	20	58		16	26	

DEC 19, 1981

WOG MANITOBA 1980 PROFILE NO. 13

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: VARIANT; DEVIATION(S): TEXTURE; VERY LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: ORTHIC GRAY LUVISOL. MINERAL SOIL FAMILY: SANDY SKELETAL, CARBONATIC, ALKALINE, STRONGLY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: NOTATION: WOG, ASSOCIATED SOILS: LRY.

LOCATION: MILITARY GRID REF. 14 UPK 8662 5011; NTS MAP AREA 62H ; SE 3 4 8 E.

VEGETATION: KEY SPECIES LISTING: 1 POPULUS TREMULOIDES - TREMBLING ASPEN, 2 PINUS BANKSIANA - JACK PINE. SASKATOON,ROSACEAE, GRASSES.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SKELETAL (>35% OF PARTICLES 2-25 CM) AND SANDY, MODERATELY TO VERY STRONGLY CALCAREOUS (6-40% CACO3), GLACIOLACUSTRINE, IGNEOUS; LANDFORM CLASSIFICATION: LACUSTRINE, GRAVELLY, RIDGED; SLOPE: 2% SIMPLE SLOPE OF CLASS 2 (0.5-2%), FACING EAST, SITE AT LOWER SLOPE POSITION, LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: WELL DRAINED, MODERATELY PERVIOUS, MODERATE SURFACE RUNOFF, SEEPAGE ABSENT; NONSTONY; PRESENT LAND USE: MINES,QUARRIES,ETC.

INTERPRETATIONS: CLI AGRICULTURE 6/M.

AHE: 0 TO 2 CM; MATRIX MOIST 10YR 4/1, MATRIX DRY 10YR 2/1; LOAMY SAND; STRUCTURELESS STRUCTURE; SOFT CONSISTENCE; PLENTIFUL, VERY FINE, VERTICAL ROOTS; MODERATELY POROUS, FEW, VERY FINE, RANDOM PORES; SMOOTH, ABRUPT HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

AE: 2 TO 20 CM; MATRIX MOIST 10YR 7/4, MATRIX DRY 10YR 5/4; SAND; STRUCTURELESS STRUCTURE; SLIGHTLY HARD CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; MODERATELY POROUS, FEW, VERY FINE, RANDOM PORES; SMOOTH, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BT: 20 TO 33 CM; MATRIX MOIST 7.5YR 6/5, MATRIX DRY 10YR 5/6; SANDY LOAM; WEAK, MEDIUM TO COARSE, SUBANGULAR BLOCKY STRUCTURE; HARD CONSISTENCE; FEW, VERY FINE, VERTICAL ROOTS; MODERATELY POROUS, VERY FEW, VERY FINE PORES; MANY, THIN CLAY FILMS VISIBLE BRIDGES BETWEEN SAND GRAINS, 7.5YR 4/4; SMOOTH, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CK1: 33 TO 50 CM; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 6/4; GRAVELLY COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; SLIGHTLY POROUS, VERY FEW, VERY FINE PORES; VERY WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; SMOOTH, CLEAR HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CK2: 50 TO 100 CM; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 6/4; GRAVELLY COARSE SAND; STRUCTURELESS STRUCTURE; LOOSE CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; WEAK EFFERVESCENCE; MODERATELY CALCAREOUS; MILDLY ALKALINE 7.4-7.8 FIELD PH.

CHEMICAL DATA (SURVEY)

								C.E.C. (ME/100G)		EXCHANGEABLE CATIONS BUFFERED (ME/100G)			
HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL- CITE (%)	DOLO- MITE (%)	EXTR ACID	BUFF.	PERM. CHARG	CA	MG	NA	K
AHE	7.3	3.51	0.12				0.9	13.6		10.6	2.3	0.2	0.1
AE	7.1	0.10	0.02				0.3	3.4		1.8	0.7	0.1	0.1
BT	7.4	0.94	0.07	8.2	0.0	7.6	0.6	15.3		12.1	4.1	0.1	0.1
CK1	7.8			12.4	0.8	10.7		2.6		7.0	1.2	0.1	
CK2	7.8			11.3	3.7	7.0		0.9		4.5	0.3	0.1	

DEC 19, 1981

WOG MANITOBA 1980 PROFILE NO. 13

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
AHE	0.4	38.0
AE	0.2	22.0
BT	0.3	32.0
CK1	0.2	23.0
CK2	0.2	22.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

	% PASSING				% OF SAMPLE									
HORIZON	3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AHE					1	9	30	41	5	86		9	5	
AE					2	7	27	48	7	91		6	3	
BT					5	8	28	33	5	79		8	13	
CK1				62	18	24	22	30	3	97		2	1	
CK2				59	4	34	30	31	0	99		1	0	

DEC 19, 1981

CIO MANITOBA 1980 PROFILE NO. 20

IDENTIFICATION: SURVEYED BY LAH, FOR THE PURPOSE OF RECONNAISANCE SURVEY; PROVINCIAL SOIL SURVEY, WINNIPEG,MAN. STATUS: MODAL; VERY LIMITED EXTENT.

CLASSIFICATION: TAXONOMIC SYSTEM OF THE YEAR 1978, SUBGROUP: GLEYED GRAY LUVISOL. MINERAL SOIL FAMILY: SANDY/LOAMY, CARBONATIC, EXTREMELY CALCAREOUS, COOL, SUBHUMID. SOIL MAP UNIT: TAXONOMIC SERIES, NOTATION: CIO, ASSOCIATED SOILS:SLB AND PLN. SOIL PHASES: LEVEL AND SLIGHTLY STONY AND MODERATELY STONY.

LOCATION: MILITARY GRID REF. 14 UPK 8487 5105; NTS MAP AREA 62H ; NW 4 3 8 E.

CLIMATE: SOIL TEMP READING NO. 1 WAS 24 DEG(C) AT 20 CM IN JULY, NO. 2 WAS 20 DEG(C) AT 50 CM IN JULY, NO. 3 WAS 15 DEG(C) AT 100 CM IN JULY.

VEGETATION: GRASSES AND FORBES, UNDISTURBED. KEY SPECIES LISTING: 1 POPULUS - ASPEN. GRASSES, ALUMROOT.

SOIL SITE: PARENT MATERIAL 1: UNSPECIFIED WEATHERING, SANDY, WEAKLY CALCAREOUS (1 TO 6% CACO3), LACUSTRINE, MIXED; PARENT MATERIAL 2: UNSPECIFIED WEATHERING, COARSE LOAMY AND COARSE SILTY (<18% CLAY), EXTREMELY CALCAREOUS (>40% CACO3), MORAINAL (TILL), MIXED; LANDFORM CLASSIFICATION: LACUSTRINE, SANDY, LEVEL; SLOPE: 0.5% SIMPLE SLOPE OF CLASS 1 (0-0.5%), LEVEL MICROTOPOGRAPHY,; SOIL MOISTURE AND DRAINAGE: SUBHUMID, IMPERFECTLY DRAINED, MODERATELY PERVIOUS AND SLOWLY PERVIOUS, SLOW SURFACE RUNOFF, SEEPAGE ABSENT; SLIGHTLY STONY AND MODERATELY STONY; PRESENT LAND USE: IMPROVED PASTURE,FORAGE.

INTERPRETATIONS: CLI AGRICULTURE 3/WM.

SPECIAL NOTES: THIS PASTURE TO DRY TO USE THIS YEAR. THIS PROFILE HAS BEEN CULTIVATED,THEREFORE HAS AN AP HORIZON. CARBONATE COATINGS PRESENT AROUND STONES (LST) IN BTG HORIZON

AP: 0 TO 15 CM; HORIZON MOIST; MATRIX MOIST 10YR 3/1, MATRIX DRY 10YR 4/1; FINE SAND; WEAK, FINE TO MEDIUM, GRANULAR STRUCTURE; VERY FRIABLE CONSISTENCE; PLENTIFUL, MICRO, VERTICAL ROOTS; SMOOTH, ABRUPT HORIZON BOUNDARY; MILDLY ALKALINE 7.4-7.8 FIELD PH.

AE: 15 TO 21 CM; HORIZON MOIST; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 7/2; FINE SAND; WEAK, FINE, SUBANGULAR BLOCKY STRUCTURE; VERY FRIABLE CONSISTENCE; FEW, MICRO, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BMGJ: 21 TO 45 CM; HORIZON DRY; MATRIX MOIST 10YR 6/4, MATRIX DRY 10YR 7/3; FINE SAND; MANY, MEDIUM, PROMINENT, 5YR 4/8 MOTTLES; MODERATE, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; SLIGHTLY HARD CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

BTGJ: 45 TO 55 CM; HORIZON MOIST; MATRIX MOIST 10YR 4/4, MATRIX DRY 10YR 5/4; SANDY CLAY LOAM; FEW, FINE, FAINT MOTTLES; MODERATE TO STRONG, MEDIUM, SUBANGULAR BLOCKY STRUCTURE; FIRM AND VERY FIRM CONSISTENCE; VERY FEW, MICRO, VERTICAL ROOTS; CLAY FILMS VISIBLE BRIDGES BETWEEN SAND GRAINS, 10YR 3/3; 40% ANGULAR COBBLY COARSE FRAGMENTS; WAVY, CLEAR HORIZON BOUNDARY; NEUTRAL 6.6-7.3 FIELD PH.

2CKG1: 55 TO 75 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/2, MATRIX DRY 10YR 8/1; FINE SANDY LOAM; FEW, FINE, FAINT MOTTLES; WEAK, VERY FINE TO FINE, PLATY STRUCTURE PSEUDO; FRIABLE CONSISTENCE; STRONG EFFERVESCENCE; EXTREMELY CALCAREOUS; 20% ANGULAR GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

2CKG2: 75 TO 130 CM; HORIZON MOIST; MATRIX MOIST 10YR 7/3, MATRIX DRY 10YR 8/3; FINE SANDY LOAM; FEW, FINE, FAINT MOTTLES; 7.5YR 6/8 MOTTLES; WEAK TO MODERATE, FINE TO MEDIUM, PLATY STRUCTURE PSEUDO; FRIABLE CONSISTENCE; MODERATE EFFERVESCENCE; EXTREMELY CALCAREOUS; 20% ANGULAR GRAVELLY COARSE FRAGMENTS; MODERATELY ALKALINE 7.9-8.4 FIELD PH.

DEC 19, 1981

CIO MANITOBA 1980 PROFILE NO. 20

CHEMICAL DATA (SURVEY)

HORIZON	PH 1	ORG C (%)	TOTAL N (%)	CALC CARB EQU.%	CAL-CITE (%)	DOLO-MITE (%)	EXTR ACID	C.E.C. (ME/100G) BUFF.	C.E.C. (ME/100G) PERM. CHARG	EXCHANGEABLE CATIONS BUFFERED (ME/100G) CA	MG	NA	K
AP	6.5	1.78	0.13				1.7	9.0		5.3	1.0	0.2	0.1
AE	6.8	0.24	0.03				1.0	3.1		1.0	0.2	0.1	
BMGJ	6.7	0.13	0.01				1.0	3.0		1.1	0.3	0.1	
BTGJ	7.3	0.35	0.04	0.8			2.8	20.3		11.4	4.9	0.1	0.4
2CKG1	7.8			40.1	14.2	23.9		4.6		16.4	1.5	0.1	0.1
2CKG2	7.9			38.5	15.8	20.9		3.6		16.8	1.2	0.1	0.1

CHEMICAL DATA (SURVEY)

HORIZON	ELEC COND (MMHOS/CM)	% H2O AT SATUR
AP	0.3	35.0
AE	0.2	25.0
BMGJ	0.1	26.0
BTGJ	0.3	39.0
2CKG1	0.4	23.0
2CKG2	0.3	23.0

PHYSICAL DATA (SURVEY)

PARTICLE SIZE ANALYSIS

HORIZON	% PASSING 3" SIEVE	.75" SIEVE	NO.4 SIEVE	NO.10 SIEVE	% OF SAMPLE V.C. SAND	C. SAND	MED. SAND	F. SAND	V.F. SAND	TOT. SAND	70-2U SILT	50-2U SILT	2U CLAY	0.2U CLAY
AP					3	9	18	49	10	89		7	4	
AE					4	7	16	53	14	94		4	2	
BMGJ				96	4	7	16	60	10	97		2	1	
BTGJ				81	14	10	14	33	7	78		2	20	
2CKG1				92	4	5	10	20	18	57		34	9	
2CKG2				92	4	5	8	21	18	56		33	11	

PHYSICAL DATA

HORIZON	SURVEY (CON'T) MOISTURE STATUS (%) 0.1 ATM	0.33 ATM	15 ATM	HYGR. MOIST	FIELD MOIST	ENGINEERING ATTERBURG PLASTIC LIMIT (%)	ATTERBURG LIQUID LIMIT (%)	SHRINKAGE LIMIT (%)	OPT MOIST CONTENT (%)	MAX DRY DENSITY (G/CC)	COLE VALUE	AASHO CLASS	UNIFIED CLASS
AP	24.1	14.9	4.5										
AE													
BMGJ	12.5	3.7	1.4										
BTGJ	23.7	19.3	10.3										
2CKG1													
2CKG2	18.8	13.4	4.4			12.0	15.0	16.7				40	07

Appendix G

METHODS OF PHYSICAL AND CHEMICAL ANALYSIS

Bulk Density - G.R. 1965. Bulk Density. In Agronomy No. 9 "Methods of Soil Analysis", Part 1. Black, C.A. Ed. 375.

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Cation exchange capacity and ammonium acetate extractable cations - Chapman, H.D. 1965. Cation Exchange Capacity. In agronomy No. 9. Methods of Soil Analysis, Part 2. Black, C.A. Ed. 891-899.

Conductivity - U.S. Department of Agriculture. 1954. Diagnosis and improvement of saline and alkaline soils. Agric. Handbook No. 60.

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Exchange acidity - Peech, M. 1965. Exchange Acidity. In agronomy No. 9. Methods of Soil Analysis. Part 2. Black, C.A. Ed. 910-911.

Liquid Limit - Procedures for texting soils. 1958. A.S.T.M. Designation D423-54T. 94-98.

Nitrogen - Bremner, J.M. 1965. Total Nitrogen. In Agronomy No. 9. Methods of Soil Analysis. Part 2. Black, C.A. Ed. 1162-1164.

Organic Carbon - Walkley, A. and Black, I.A. 1934. An examination of the Degtjareff method for determining soil organic matter and a proposed modification of the chromic acid titration method. Soil Sci. 37:29-38.

Particle size analysis - Kilmer, V.J. and Alexander, L.T. 1949. Methods of making mechanical analysis of soils. Soil Sci. 68:15-24.

pH - Peech, M. 1965. Hydrogen-ion activity. In Agronomy No. 9 "Methods of Soil Analysis", Part 2. Black, C.A. Ed. 891-899.

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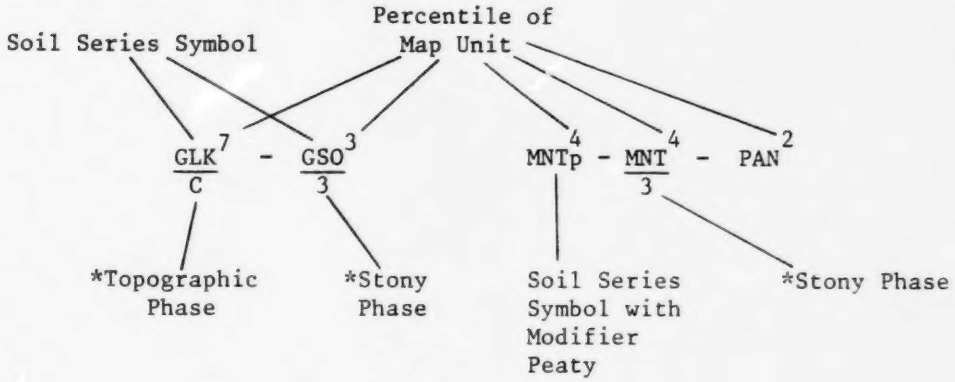
Plastic Limit - "Procedures for testing soils". 1958. A.S.T.M. Designation D424-54T. 99-101.

Skrinkage Limit - "Procedures for testing soils". 1958. A.S.T.M. Designation D424-39. 76-79.

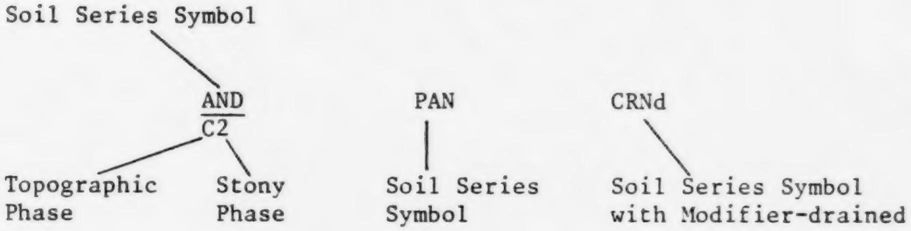
Appendix H

MAP SYMBOLOGY AND LEGEND

Compound Map Units


Percentile of Map Unit
Soil Series Symbol
GLK 7 / C - GSO 3 / 3
MNTp 4 - MNT 4 / 3 - PAN 2
*Topographic Phase
*Stony Phase
Soil Series Symbol with Modifier Peaty
*Stony Phase

Simple Map Units


Soil Series Symbol
AND / C2
PAN
CRNd
Topographic Phase
Stony Phase
Soil Series Symbol
Soil Series Symbol with Modifier-drained

* These phases are defined in the Glossary, Appendix A

Soil Series Symbol Modifiers include:

p: peaty phase: soils having a 15 to 40 cm layer of mesic peaty surface. eg., MNTp, MEBp

d: drained phase: usually poorly drained soils which have had their drainage improved. eg., CRNd

SOIL LEGEND

Soil Symbol	Soil Name	Surface* Texture	Soil Drainage	Mode of Deposition	Family Particle Size*	Subgroup
AND	Aneda	L	Well	Morainal	Loamy	O.DG
BAM	Balmoral	CL	Poor	Lacustrine	Fine Loamy	R.HG
BLO	Berlo	LFS	Imperfect	Lacustrine	Sandy	GLD.GL
BUR	Beaverdam	LS	Imperfect	Lacustrine/Morainal	Sandy Skeletal/Loamy	GL.DG
BYD	Berry Island	LS	Poor	Lacustrine/Morainal	Sandy Skeletal/Loamy	R.HG
CAY	Cayer	Mesic peat	Poor	Organic/Lacustrine	Organic/Loamy to Clayey	T.M.
CIO	Caliento	FS	Imperfect	Lacustrine	Sandy	GL.GL
CRN	Crane	Mesic peat	Poor	Organic/Morainal	Organic/Loamy	T.M
DVD	Davidson	LFS	Well	Lacustrine	Sandy	O.DG
FOY	Foley	FSL-L	Poor	Lacustrine	Loamy	R.HG
FYL	Fyala	C	Poor	Lacustrine	Clayey	R.HG
GDT	Grindstone	Mesic peat	Poor	Organic/Morainal	Organic/Loamy	T.M
GEW	Greenwald	FSL-L	Imperfect	Lacustrine	Coarse Loamy/Clayey	GL.DG
GLK	Gull Lake	LS-Gr	Well	Outwash/Morainal	Sandy Skeletal/Loamy	D.GL
GNL	Glenella	FSL-L	Imperfect	Lacustrine	Coarse Loamy	GLR.BL
GRX	Giroux	FS-LFS	Imperfect	Lacustrine	Sandy	GL.DG
GSO	Garson	L	Well	Morainal	Loamy	O.GL
GUO	Gunton	LS-Gr	Well	Outwash/Morainal	Sandy Skeletal/Loamy	O.DG
IWO	Inwood	L	Imperfect	Morainal	Loamy	GL.DG
JUS	Julius	Fibric peat	Poor	Organic	Organic	TY.F
KIC	Kircro	Mesic peat	Poor	Organic/Lacustrine	Organic/Sandy	T.M
KLI	Kline	C	Poor	Lacustrine	Clayey	R.HG
KPN	Kiplin	C	Imperfect	Fluvial	Clayey	GL.DG
KRW	Kergwenan	LS-Gr	Imperfect	Outwash	Sandy Skeletal	GL.DG
LAB	Labroquerie	FS-LFS	Imperfect	Fluvial	Sandy	GLCU.R
LAM	Lambert	FSL-L	Poor	Lacustrine	Loamy/Sandy	R.HG
LGP	Long Point	FS-Gr	Well	Outwash/Morainal	Sandy Skeletal/Loamy	O.GL
LRY	Leary	LS-Gr	Well	Outwash	Sandy Skeletal	O.DG
LSD	Lonesand	FS	Imperfect	Lacustrine	Sandy	GLE.DYB
LSW	Lenswood	LFS	Imperfect	Lacustrine	Sandy	GLR.BL
MAR	Marchand	LFS-FSL	Poor	Fluvial	Coarse Loamy	R.HG
MEB	Meleb	L	Poor	Morainal	Loamy	R.HG
MLI	McKinley	L-CL	Poor	Lacustrine	Fine Loamy	R.HG
MNT	Malonton	FS	Poor	Lacustrine	Sandy	R.HG
MRQ	Marquette	C	Imperfect	Lacustrine/Morainal	Clayey/Loamy	GLR.BL
MRS	Morris	C	Imperfect	Lacustrine	Clayey	RH.G
NIV	Niverville	L-CL	Imperfect	Lacustrine	Fine Loamy/Clayey	GLR.BL
NUS	Nourse	FSL-L	Imperfect	Lacustrine	Loamy/Clayey	GL.DG
OBO	Osborne	C	Poor	Lacustrine	Clayey	R.HG
OVO	Overflowing	Mesic peat	Poor	Organic	Organic	HY.M
PAN	Pansy	FS	Imperfect	Lacustrine	Sandy	GLE.EB
PGE	Partridge Creek	C	Poor	Lacustrine/Morainal	Clayey/Loamy	R.HG
PGU	Peguis	C	Imperfect	Lacustrine/Morainal	Clayey/Loamy	GL.DG
PIY	Piney	L	Imperfect	Morainal	Loamy	GL.GL
PLN	Pelan	LFS	Imperfect	Lacustrine/Morainal	Sandy/Loamy	GL.DG
PMU	Pinemimuta	L-CL	Poor	Lacustrine/Morainal	Loamy	R.HG
PPL	Poppleton	LFS	Imperfect	Lacustrine	Sandy	GL.DG
PRA	Prawda	FS-LFS	Poor	Lacustrine	Sandy/Clayey	R.HG
PRG	Pine Ridge	LFS	Well	Lacustrine	Sandy	E.EB
RIV	Red River	C	Imperfect	Lacustrine	Clayey	GLR.BL
RRV	Reed River	Humic Peat	Poor	Organic	Organic	T.H
RTV	Rat River	Mesic peat	Poor	Organic	Organic	T.M
SCY	Scanterbury	C	Imperfect	Lacustrine	Clayey	GL.BL
SDI	Sandilands	FS	Well	Lacustrine	Sandy	E.DYB
SIK	Sirko	LS-Gr	Imperfect	Outwash	Sandy Skeletal	GL.GL
SLB	St. Labre	LFS	Well	Lacustrine/Morainal	Sandy/Loamy	O.GL
SPG	Sprague	FS	Poor	Lacustrine/Morainal	Sandy/Loamy	R.HG
SRE	Siene River	C	Imperfect	Fluvial	Clayey	GlCU.R
SRL	Spearhill	LS-Gr	Imperfect	Outwash	Sandy Skeletal	GLR.DG
STD	Stead	Mesic peat	Poor	Organic	Organic	TY.M
SUJ	South Junction	Humic peat	Poor	Organic/Lacustrine	Organic/Loamy to Clayey	T.M
SUW	Sundown	LS-Gr	Poor	Outwash	Sandy Skeletal	R.HG
THG	Thalberg	C	Imperfect	Lacustrine	Clayey	GLSZ.DG
VIT	Vita	LS-Gr	Imperfect	Outwash/Morainal	Sandy Skeletal/Loamy	GL.GL
VLW	Venlaw	LS-Gr	Well	Outwash	Sandy Skeletal	D.GL
WDN	Weiden	FSL-L	Poor	Lacustrine/Morainal	Coarse Loamy	R.HG
WGE	Wintergreen	LFS	Imperfect	Lacustrine	Sandy	GL.GL
WOG	Woodridge	LS-Gr	Well	Outwash	Sandy Skeletal	O.GL
WOM	Woodmore	FSL-L	Imperfect	Lacustrine/Morainal	Sandy	GL.DG
ZHD	Zhoda	LFS	Well	Lacustrine	Sandy	D.GL

*** Definition of these terms are found in Appendix A.**

MAPS NOT

FILMED

CARTES

OMISES